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ABSTRACT

This document provides preschool teachers with activities intended to help children better understand the world around them. The introductory section of this book includes papers focusing on the cognitive development of the preschooler, encouraging the integration of science into the early childhood curriculum, promoting multisensory science experiences for young children, and describing the organization of the remainder of the sourcebook. The book contains 55 activities and is divided into sections on general science, life science, and physical science. Each activity includes: (1) a focus statement that delineates the concepts and/or skills developed by the activity; (2) a challenge statement, intended to stimulate the children's interest; (3) a listing of materials and equipment needed to carry out the activity, including simple construction plans for some homemade apparatus; (4) a how-to-do-it section which provides suggestions for planning, organizing, and actually implementing the activities with youngsters; (5) ideas for further challenges that could lead to follow-up activities; and (6) references used. (TW)

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SCIE RIENCES FOR PRESCHOOLERS

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Compiled and Edited by

Leon Ukens

The Council for Elementary Science, International

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SCIENCE EXPERIENCES FOR PRESCHOOLERS

CESI SOURCEBOOK IV

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An Occasional Sourcebook of

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The ERIC Clearinghouse for Science, Mathematics, and Environmental Education is pleased to cooperate with the Council for Elementary Science International in producing this fourth sourcebook. We believe that this publication will be of value to elementary and middle school teachers who wish to enrich their science programs with activities emphasizing creativity, inventiveness, and problem solving.

We invite your comments and suggestions for future publications.

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U.S. Department of Education

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PREFACE

Rachel Carson wrote "If a child is to keep alive his inborn sense of wonder...he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in." For her young nephew, Rachel Carson provided this companionship.

Companionship and teaching, I believe, go hand in hand. Teachers who are committed to sharing the world with children often leave a lasting impact on those children. This sourcebook, Science Experiences for Preschoolers, suggests many opportunities for involving children in the world around them. Open the book to any page; CESI Sourcebooks are collections of experiences to be sampled as you see fit. CESI is certain that you will enjoy using this book as much as the children will enjoy the experiences.

Science Experiences for Preschoolers is fourth in a series of sourcebooks compiled by CESI and published by ERIC/SMEAC. To Leon Ukens who compiled and edited this sourcebook, CESI owes a debt of gratitude. Our friends at ERIC/SMEAC made it possible; we say "thank you." And, of course, we appreciate the contributions of the many authors whose collective work comprises this sourcebook.

Barry A. VanDeman
President, CESI 1985-86

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Many individuals contributed to the development of this sourcebook. Thanks go to Frances Bond and her early childhood education graduate students at Towson State University; Allison McGlone from the Maryland Committee for Children, Inc.; Audrey Brainard from Georgian Court College; and Phyllis Marcuccio of NSTA for review, advice, and encouragement. Also, thanks to Lorraine Lambdin for typing and editing and Deborah Ozdowski for the illustrations. Without their help, the sourcebook would not have been possible.

CESI (The Council for Elementary Science, International), an affiliate of the National Science Teachers Association, is an organization interested in improving the science education of children. It is an organization OF teachers, presenting conventions and publications BY and FOR teachers.

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CHAPTER I

INTRODUCTION

"Probably the single greatest contribution which early education in science can make to a people is the development of a belief based on evidence, that they can to some extent influence the direction and quality of their destiny."

Mary Budd Rowe

DESCRIPTION OF THE COGNITIVE DEVELOPMENT OF THE PRESCHOOLER

by Gerald Wm. Foster

Four-year olds cannot learn and do some of the things a ten-year old is capable of doing. By this acknowledgement, it is recognized that there is a hierarchy to intellectual development. Jean Piaget and his followers have interviewed numerous children to formulate a theory of intellectual development that supports a hierarchy. Piaget has written about stages of intellectual development that are on a continuum from simple sensory interactions with the environment to a complex interaction of abstract mental operations.

This continuum consists of four major stages characterized by substages. The four stages begin with the sensori-motor, followed by the preoperational, concrete operational, and formal operational. All children move intellectually through the stages but not at the same time and same rate. Likewise, since the stages are a continuum, a child may be in more than one stage at the same time. According to Piaget, there is an approximate age at which each stage occurs, but it would be incorrect to label a child with one of the four stages. Because most preschoolers will be in the first two stages, we will look at these in a little more detail.

To begin with, the sensori-motor stage (birth to approximately two years of age) is characterized by the child exploring the immediate environment by observing, making noises and sound, and particularly, through touching. The coordination of senses and physical action occurs, but using any kind of logic does not.

The preoperational stage, approximately two years to six years, is characterized by the development of internal representation of objects and things in the environment. Objects become permanent at this stage and do not disappear. It is also characterized by the child learning to give objects representation by symbols such as words and drawings. Language occurs in monologues and repetitive statements because the child is still centered on self, and there is not much communication.

Play, imitating adults, animals, etc., and make believe are also ways that children at this stage use symbolism to represent their environment. They play house, store, imitate T.V. shows, and make up monsters, dragons, etc. They are usually incapable of cooperative type play before the age of four years. In other words, they cannot follow predetermined sets of rules but make up their own rules as well as change them while they are in the midst of play.

The formation of logic is still not present during the preoperational stage. Even though objects have permanence, children may not be able to conserve amounts of objects if the shape changes. For example, a lump of clay formed in a ball may appear bigger or smaller to a child if it is formed into an oblong shape. The child is not capable of reversing thought back

to the original shape of the clay and realizing that the amount of clay is the same even though the shape has changed. The preoperational child is also influenced by perceptions. The child may think the house in the distance is really small or that the railroad really narrows. By observing drawings of children at this age level, one can see how perceptions influence how they place houses, trees, etc., on the side of a mountain.

According to Piaget, developmental thought is influenced by four factors. The four factors are nervous system maturation, socialization with others, experience with objects, and self-regulation. Self-regulation is the most important of the four factors. When learning occurs, it is because a discrepant event occurs between the child's mental structures and the environment. This disequilibrium in the child's thinking occurs because of the combined factors of maturation, social interactions, and experience. With the help of these factors, the child mentally operates on the discrepant event and internalizes the new information into existing mental operations or the new information causes a restructuring of mental structure into a different organization. It is through this self-regulation process that a child moves from one stage to the next.

Reference:

Bybee, Rodger W., and Robert B. Sund. Piaget for Educators. Columbus, OH: Charles E. Merrill Publishing Co., 1982.

INTEGRATING SCIENCE INTO THE EARLY CHILDHOOD CURRICULUM

by Joan Tephly

From hand to mouth, from viewing to sniffing, the young child uses all available senses to explore the world. And much of what attracts the young child's attention is the natural world. All experiences flow together. An apple, a painting of an apple, and a silly story about apples--all contribute to a child's knowledge about apples. This wholistic exploration of the world represents the nature of the young child.

The environment and curriculum for the young child must acknowledge this wholistic approach. The attention span of the young child is short, and teacher-led group activities need to be of short duration. While many patterns exist in early childhood settings for the management of open-exploration times, the need for the availability of teacher-planned activities and materials presents a constant ongoing challenge. It is in fulfilling this type of need that integration becomes a meaningful way to extend curriculum themes--and science exposures fit in easily to this approach.

The nature of science when viewed as a construction of the human mind in an attempt to explain observable and manipulative phenomena is far more wholistic than the delivery of it under its established disciplines would lead us to believe. Some of the great early and present day scientists would not have made their contributions if they had limited their mental explorations to the structure of a discipline. Creativity, thus, is enhanced by an expansive exploration of phenomena. Nourishment of divergent thinking should begin in early childhood and continue into adulthood.

The nature of science as it can be approached by the preschool child must also be considered in curriculum planning. Aspects of the scientific process can be applied to the early childhood classroom. First, the young child is a natural observer, and, as mentioned earlier, observation can come through varied sensory modalities. Second, because these are also critical years for language growth, a major role for the preschool teacher is to guide children in identification (and the vocabulary needed for it) and classification schemes (and their needed vocabulary). Examples: What color is the snow? (Yes, the snow is white.) How does the snow feel? (It is cold.) How does the apple feel? (It is smooth.) Look at this insect--what is it doing? Is it flying? Is it walking? Is it swimming? (Yes, it is flying now.) Does it have legs? How many? (Six.)

An overview of a few questions like this highlight the significance of the teacher's role as a guide and facilitator--and much of this opportunity will occur spontaneously in the classroom setting. The early childhood teacher must be prepared to use spontaneous happenings as "moments of learning."

Prediction is a third aspect of the scientific process which can also be applied in working with young children. The young child's lack of experience can lead to some wild predictions, and this should be kept in mind in evaluating the effectiveness of a prediction experience. The use of "magic" with young children is extremely effective in fostering curiosity, again because of their relative lack of experience and knowledge. Prediction can be introduced in two ways. One is the identification of children's predictions before the observable event: What do you think will happen to the snow if we bring it indoors? Accept all ideas as good guesses, even after the correct predictions have been identified. Make all children feel their ideas are of value and worth expressing--even if they turn out to be wrong. This is the true scientific investigative attitude and it can be fostered early. The second approach to prediction is with the "magic" observable phenomena first. For example, evaporate the water out of an electric fry pan. The children will be amazed. Then ask them to describe what happened. This is really an "after the fact" observation and description, not a prediction. Use the observation to elicit children's predictions of what will occur if the event is repeated: What do you think will happen if we boil the water in the fry pan again? The predictable repeatability of the event will guide the children toward the conscious realization that there are constant repeatable events in this world, and, in some cases, they can have control over these events. You will have taken them through a fourth dimension of the scientific process--testing.

Scientific principles can also be presented to the preschool ages. The teacher must, however, realize the limitation of young children's thinking. Scientific principles must be worded in language appropriate to young children. Instead of describing the behavior of water molecules when exposed to increased temperature, a teacher must say something like, "When water becomes hot enough, it changes to a gas like the air all around us." Most four- and five-year olds will believe this happened; most will even believe that, under the same circumstances, it will happen again; several will be able to echo what the teacher said, but the process will not be understood. Piagetian theory has shown the extreme difficulty young children have understanding concepts until they are developmentally ready. Does that mean that such curricular material should not be presented? No, because in the child's memory will be aspects of the experience even if not fully understood. Even asking a question of young children without answering it--I wonder what would happen to this snow if I brought it indoors?--suggests to the child a meaningful question to ask and check out someday.

These types of opportunities to guide children along scientific thinking processes or toward the acquisition of basic scientific knowledge occur throughout an early childhood program. The teacher-prepared presentation of experiences and materials is, of course, the most obvious way to teach science. It is what this sourcebook is primarily about. Teacher-planned activities will naturally lend themselves to involvement in other planning areas. If you are discussing space, a spaceship and astronaut dress-up is a natural and exciting extension in the dramatic-play area. Making astronaut gear or developing a mission-control center could be part of the art/woodworking activities. A cooking activity could revolve around the

types of food astronauts take into space (and why). Books could be used to extend understanding--and don't be afraid of the Star Wars fantasies because they provide a valuable opportunity to help children separate fact and fantasy (some will be able to and some won't, but again, you are teaching the idea). The outdoor climber might become a spaceship, and games like "Jumping on the Moon"* can be played. Use poetry, such as the Mother Goose rhyme where the cat jumps over the moon, and books, including myths--again to let children have fun with fantasy and also to realize that people used to have different ideas about space in the past.

Approach science from spontaneous happenings in the children's lives. Examples: Sally lost her first tooth--and suddenly you are studying teeth and maybe other parts of the human body. One of the guppies in your fish bowl gives birth right during your session--and suddenly animal reproduction is a natural to study. Donny brings his new two-wheeled bike to show--and suddenly, should you study safety, wheels, machines, gravity (there are so many ways one could go)?

The more you try to integrate the curious and wholistic approach of the young child, the easier it will become. You will have more "science things" to do than you will probably have time for!!

*jumping fun on a small trampoline or inflatable tube jumper

SCIENCE IS BEING THERE

by Emmy L. Widmer

For young learners, science is, literally, being there. "There" refers to a setting which encourages multisensory opportunities to experience, to develop wholesome attitudes, sharpen powers of observation, whet curiosity, check clues, discover new information, search for causes, and stimulate further interests. Although understanding of processes will be tentative and sketchy, it is here at the preschool and early childhood levels that concepts will bud and be nourished through observation, hands-on exploration and experimentation.

"Being there" includes "messing about." Teachers who are themselves aware of the spellbinding wonders which unfold in discoveries behind the questions, "how," "why," "where," "when," and "how come" will not be guilty of merely tolerating the mess this process approach often entails. In fact, "messing about" needs to be viewed as the very heart of a vital science curriculum at any and all developmental levels. This "playing around," as it is also viewed by the unenlightened, is the very act by which our young begin to make sense of the physical world around them. Actually, it is the only way these young learners can self-regulate the myriad sensations with which they are constantly bombarded.

Fortunately, the preschool child population brings to the school setting all the essential internal resources necessary for the development of concepts. These include insatiable curiosity, abiding interest in the surrounding physical world, and a propensity for active physical involvement. These children come to their first learning environment ready for direct, firsthand experiences and are fascinated by the changes they observe in plant life, animals, seasons; by the power of the magnet and the magnifying glass; heat; water; and by science phenomena in general.

With selection comes exclusion, however, and in these early stages of development, the child needs time to explore all kinds of experiences. Variety is not only interesting, but necessary. To caring, sensitive teachers, the child persistently shows us ways in which we can contribute if we have the perception and humility to listen, and the judgment and imagination for appropriate response.

Sources for the science experiences of these young learners are fourfold: 1. The preplanned science themes or units which the teacher intends to incorporate within her weekly and monthly program segments for a particular group of children for the school year; 2. The children's special interests and enthusiasms; 3. The teacher's own interests, strengths, and special talents; and 4. The incidental happenings which occur spontaneously and upon which the teacher wisely capitalizes as rich, productive learning sources.

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Carefully selected materials, books, pictures, films, filmstrips, records, objects, trips and excursions can enhance hands-on activities and the ongoing discovery process. A science center away from the heavy traffic of the block and housekeeping areas should be considered an indispensable part of the learning environment for these preschool/early childhood groups. Such a center provides an inviting, ever-present location for encouragement of observation, manipulation, and discovery. It will contain low shelves, table, chairs, bulletin board, rotating materials and equipment, treasures, collections, specimens, aquarium, and whatever else the fertile wonderings of children and teachers can conceive. "Being there" is being able to question, touch, feel, see, listen, predict, measure, identify, and classify.

Science becomes a way of life in this kind of setting; it becomes an integral part of the waking experience. The emphasis is on being there--and being a part of an active learning process--which is a sound, mind-stretching introduction to the more formal learnings of the later elementary school years.

WHAT THIS BOOK IS ALL ABOUT

by Leon Ukens

Science Activities for Preschoolers is the fourth sourcebook of the Council for Elementary Science, International. The other three are Outdoor Areas as Learning Laboratories, compiled and edited by Alan J. McCormack; Expanding Children's Thinking Through Science, compiled and edited by Michael R. Cohen and Larry Flick; and Understanding the Healthy Body, compiled and edited by David R. Stronck. All of these sourcebooks have the same format for the activities and emphasize inexpensive, easily obtained materials and equipment.

The format for the activities is as follows:

Title: We have tried to invent titles that reflect both the fun of the activity and its learning focus. In many instances, our hope is that the title itself will pique a youngster's curiosity.

Focus: This is a short description of the concepts and/or skills developed by the activity. It also provides a quick capsulation of the activity to assist the reader in rapidly understanding what the activity is all about.

Challenge(s): Using a challenge or problem-oriented approach to activities is one good way to stimulate youngsters' interests.

Materials and Equipment:

A list of everything needed is provided with each activity. Feel free to vary the amounts of the materials to meet the needs of any class size. Construction plans are provided for homemade apparatus. Hopefully, you will be able to find all materials at little or no cost.

How-To-Do-It: These are suggestions for planning, organizing, and actually implementing the activities with youngsters. They are ways that have worked in the past. But, feel free to invent your own variations.

Further Challenges: One solved challenge always leads to new challenges (and, those-to new learning activities). Here can be found a few ideas for related, but different, learning activities. These challenges are entirely open-ended, and solutions are left to youngsters and their teachers.

References: Articles and books are identified to give both teachers and students useful information related to the activity.

Science Activities for Preschoolers is a collection of activities intended for use with children aged four and five. These activities can be modified, however, to meet the needs of slightly younger and older children as well. The intent of the activities is to get children involved in interacting with their environment. Through hands-on interactions with a

variety of materials in a variety of ways, children start developing the idea that nature is not whimsical, that they, in certain respects, can make a difference. According to Rowe, "Probably the single greatest contribution which early education in science can make to a people is the development of a belief based on evidence, that they can to some extent influence the direction and quality of their destiny."[1]

Don't worry about keeping with the structure of the activity; use them as you wish, with individuals, small groups, or an entire class. When children do become involved, they will be using the process skills, such as observing and communicating. Encourage this - it's how they learn - it's how they develop at least a beginning sense of fate control.

The activities are divided into three areas. Chapter II contains general activities, Chapter III involves life science, and Chapter IV involves the physical sciences. Admittedly, these are rather artificial divisions, especially at the preschool level. The intent is not to categorize, but rather to make it easier to find activities and to have young children and their teachers become involved in the activities.

---

[1]Rowe, Mary Budd, "Relation of Wait-Time and Rewards to the Development of Language, Logic and Fate Control: Part II - Rewards," Journal of Research in Science Teaching, 11 (4):291-308, 1974, p. 299.

CHAPTER II

GENERAL ACTIVITIES

SEEING IS BELIEVING

by Harold H. Jaus

Focus: Making good precise observations is the cornerstone of the sciences and the scientist. Preschoolers, and children in general, are usually good observers when they choose to be. Often they are not. Few children get into the real "nitty-gritty" of observing unless they view the task as important or fun, or both. Although being a good observer requires the use of the five senses, the following activities center on the use of seeing.

Challenge: Activities outlined below will elicit "nitty-gritty" observations from your children. Observations will mainly concern the sense of sight.

Materials and Equipment: None

How-To-Do-It: The best time to conduct the following activity is during the beginning of the school day. When the children are seated, have them put their heads down and close their eyes with the admonition not to peek. After they have done so, have the children describe your appearance. Have them describe what you look like; e.g., what you are wearing, the color of your clothes, hair, eyes, jewelry, hairstyle, etc. Once they have stated their observations, have them open their eyes, look at you, and then add observations they have missed to make corrections.

This activity should be done every day for several consecutive days and then occasionally during the rest of the school year. It is important to make the activity fun and to vary it. For example, purposely wear only one earring, wear a sweater on backwards, wear two different kinds of shoes, change your hairstyle, use make-up on one eye only, or roll up only one shirt sleeve. Another variation is to have the children describe a child in the room in a similar manner. There is one caution. BE PREPARED to be stared at and scrutinized when the children enter the room!

Some other activities include having the children state observations of the class pet(s), their mother or father, a telephone, a class toy or doll, their family car, or your car. Whatever you have them observe, try to make sure they state observations that include color(s) of the object, the object's relative size, shape, number of parts (for example, number of wheels), and texture.

After the children have had experience making the above observations, carry out the next activity. Make arrangements with a fellow teacher or friend and stage a fake theft. Have your colleague wear a raincoat and a hat or even a clown's outfit. As the children are seated and you are making announcements to the class, your colleague should run into the room, take something off your desk, put it into a bag, and then run out of the room mumbling words. You may want to chase the "thief." After this is accomplished, tell the children that they are to be like police detectives. They are to describe what they saw or heard.

Asking the following questions will assist them in their role as detectives. "What was the thief wearing? What colors were the thief's clothes? What did the thief say? How tall was the thief? What did the thief take off the desk? Why do you think he took that item and nothing else (inferences)? Who do you think played the thief?" After they have generated their answers, have the thief reenter the room so the children can clarify their answers and add new ones.

Further Challenges: Other types of visual discrimination tasks requiring comparison involve the use of toys and dolls such as the Cabbage Patch® dolls. Although these dolls have similar structural features, their skin, eye, and hair color are often different, as are their clothes. Having your children all bring in dolls one day would also lend itself to the activity of grouping. The dolls could be grouped based on some common attribute; e.g., hair color, eye color, size, etc. This same activity could also be carried out using toys of various kinds; e.g., trucks, cars, vans, buses, etc.

"A CLOUD IS LIKE...."

by L. Janet Lee

Focus: This activity will help to increase a child's sensory awareness.

Challenge: The children will complete the sentence, "A Cloud is Like...."

Materials and Equipment:

Clouds
Paper - white
Tape recorder (optional)

How-To-Do-It: Have children sit or lie in an open area so that they can see the clouds. If they are very small children, have them lie in a circle with heads toward the center and place a tape recorder in the center.

Have everyone complete the statement...

"A Cloud is Like...."

Each response should be recorded on tape, or paper, by the teacher.

After returning to the classroom and giving each child a sheet of paper, have them change the shape of their paper in some way by tearing off some to form a cloud. The teachers can then write their answers on the cloud shapes.

Display all cloud shapes on the bulletin board after they have been shared. You may want to read the book, It Looked Like Spilt Milk, to the children as an introduction or after the experience.

Further Challenges: Try other open ended sentences such as....

"A Dandelion is Like...."
"A Tree is Like...."
"A _____ is Like...." (be creative)

Reference:

Shaw, Charles G. It Looked Like Spilt Milk. New York: Harper & Row, Publishers, 1947.

GUESS WHAT IT IS!

by Rowlee Miller

Focus: These activities develop the idea that ordinary things may look quite different when they are magnified. Observation and communication are the skills that will be developed.

Challenge: Can children identify common things when they are magnified?

Materials and Equipment:

A microprojector and several glass microscope slides. (Perhaps these can be obtained from a biology teacher.)

How-To-Do-It: The children must have had some experience with using magnifiers in the classroom. Introduce them to the microprojector by using common items. The image may be focused on a screen or onto white paper on a table top.

Show the children what the microprojector will do by laying a single fold of tissue over the stage. Focus to show the weave of the paper. Many cloth articles can be used if they are not too tightly woven. Children enjoy seeing what their jackets, scarves, etc., look like with the microprojector.

Challenge the children with a "mystery" slide every day, then periodically thereafter. Make the slides by placing the mystery object between two glass microscope slides. Tape each end to hold them securely. REMEMBER: Light must be able to pass through if anything is to be seen.

Choose objects from the classroom that are very small or will allow light to pass through. Suggestions:

A sprinkle of sand, chalkdust, dirt, sugar, salt
A flower petal
A small, thin leaf
A spine from a cactus
Small seeds
A smear of paint or glue
A pin or needle
Thread
A spider web
A tiny insect or spider
A fly wing
Hair from a human or fur from the classroom pet
Snakeskin

The children should be encouraged to make observations--color, shape, etc. Encourage them to look around the classroom for things that are like what they observe. This is not easy for young children, so provide plenty of clues!

Further Challenges: Use it for "mysteries" during special occasions--a tiny sprig of the Christmas tree or the "grass" of Easter baskets, etc.

STASHAWAYS

by Lynne Kepler

Focus: Young children love to find small objects and examine them. This activity uses children's "natural" curiosity to help them carefully observe natural objects found around the school grounds. Getting only a quick glimpse of the objects, the children must observe those items, find matching objects, and share their discoveries.

Challenge: Find as many of these objects as you can. Do you know what this object is? How are the objects alike? How are they different?

Materials and Equipment:

One of the neat things about this activity is its adaptability. The type and quantity of objects can be varied according to the group of children and the local environment.

Suggested stashes:

pine cones	isopods	rose hips
pebbles	acorns	British soldier lichen
sweetgum fruits	acorn caps	leaves
twigs	maple whirlybirds	moss
dandelion seed heads		

Make sure you wear something with roomy pockets!

How-To-Do-It: Begin by having the children sit in a circle somewhere outside in the schoolyard. Ask them what kinds of things they see around them.

Next, slowly and secretively reach into your pocket and pull out one of the objects that you have stashed. "Have you ever seen one of these things in our schoolyard?" There is no need for answers or names, just attention to the item. Place this object on the ground in front of you and repeat with two or three more items.

When all the objects are out of your pocket, gently scoop them up in your hands and tell the children to close their eyes and imagine where in the schoolyard they might find these things. When their eyes are closed, return the items to your pocket.

Ask the children to open their eyes. "The objects are gone! Do you remember what they looked like? Can you find any of these objects in the schoolyard?" Give the children several minutes to search the area for matching objects.

Gather the children back into the circle. Pulling one of the objects out of your pocket, ask the children, "Who found one of these? Do you know what it is?" "How is your _____ like this one?" Tell the children something interesting about each of the objects. For example, maple whirlybirds are the seed from which maple trees grow.

When finished, ask the children to put the items near where they found them so that others may see them also.

Further Challenges:

1) Group the objects. Name these groups. (Living vs. non-living, rough vs. smooth, etc.)

2) Reverse the activity by asking the children to find an interesting object and bring their stashaway back to the group to share.

DO YOU HEAR WHAT I HEAR

by Charles R. Barman

Focus: This activity is designed to assist children in increasing their awareness of the sounds around them.

Challenge: The children will attempt to identify some common sounds from home and school as well as some sounds from nature.

Materials and Equipment:

Cassette tape recorder
1 cassette recording tape
1 record book (optional)

Preparation - Before conducting this activity, you will need to make a recording of several common sounds heard at home or school (i.e., a door closing, a door bell ringing, a telephone ringing, a radio, a toilet flushing, dishes and/or pots hitting together, water dripping from a faucet, etc.). Create a pause between each sound.

How-To-Do-It:

1. Assemble the children in a "listening circle."

2. Ask them to listen very carefully to each sound that is going to be played on the tape recorder. (You may want to ask them to close their eyes while each sound is played.)

3. Play each sound individually. After each sound, ask the children if they can identify it. When they give a response, ask them to explain how they arrived at their answer.

4. When the recording is completed, take the children on a walk outside. Have each child select a partner and have them walk in pairs. Tell them that they will need to listen very carefully, like they did during the recording.

5. While walking outdoors, stop periodically and ask the children to close their eyes and listen for sounds of nature.

Further Challenges: The nature walk could be conducted at various times during the year. Make a list of the sounds heard at different times of the year and keep them in a record book. Discuss this information with the children each time they participate in a nature listening activity.

MYSTERY SOUNDS

by Robert L. Burtch

Focus: The sense of hearing will be used to investigate the environment.

Challenge: Discuss the five senses and their locations. "We are going to use our sense of hearing to decide what is in each mystery container."

Materials and Equipment:

Plastic margarine or butter containers (I use 12 but you can use as few or as many as you want)

Black spray paint to paint clear plastic lids so students can't look inside

Nature materials (some possibilities include):

dirt	seeds	twigs	bark
sand	leaves	nuts	grass
water	rocks	shells	

Paper and marker to number your mystery containers

How-To-Do-It: Preparation - Make the mystery containers by placing some of the materials in the containers; for example, sand in one, water in one, etc.

Starting out:

Say: "Each of us can use our five senses to find out about our environment." Review what senses and environment mean. Environment is everything around us. Senses are parts of our body especially adapted to receive information from our environment.

Say: "We are going to use our sense of hearing today to investigate the mystery containers."

Demonstrate shaking of container near ear and have students sit in a circle or in small groups of three.

Tell students we want to find out what is in the container using only our sense of hearing.

Have children tell what they think is in each container and why. Ask for agreements and disagreements.

Further Challenges: Have children match containers which sound alike. This can be done by giving each child a container which is matched in sound to one other child. The children then try to find their "sound partner."

WATER MUSIC

by Ellen Snoeyenbos and Willard Jacobson

Focus: To discover how to create a variation in musical pitch from differing amounts of water in glass.

Challenge: What happens when we pour water into a glass and gently tap the glass? What happens with greater or lesser amounts of water?

Materials and Equipment:

Five to eight glasses which are identical in shape and size. They should be shallow with wide mouths and thick glass. "On the Rocks" glasses are ideal.

A small, wooden mallet (the type used in rhythm band sets)
A medium-sized pitcher of water
Colored tape
A sponge for wiping up spills

How-To-Do-It: This can be an individual activity, but the lesson should be given to the entire class.

1. Show children how to hold the mallet so that it swings like a pendulum below hand and held by thumb and forefinger.

2. Gently strike the side of an empty glass. What happens?

3. Ask them, "What will happen if we pour some water into the glass and strike it again?"

4. Experiment with different amounts of water in different glasses.

5. Encourage children to come up and try creating their own pitch.

6. Ultimately, it is a lot of fun to pour the exact amounts into each glass so that a complete musical octave is created. Then, using the colored tape, you can mark the exact amounts of water necessary to form the sequence of notes on each glass.

7. Show the children how their favorite songs can be produced on the glasses.

8. Children can be encouraged to do the activity on their own as long as they are aware of the need to tap gently with the mallet, pour carefully, and sponge up excess water.

Further Challenges: Some children get very excited about creating music. Other projects to create musical instruments can follow. As a circle activity, "Name That Tune" is a popular one and children can become adept at stumping the rest of the class as well as the teacher!

THE FEELY BOARD

by Charles R. Barman and Natalie S. Barman

Focus: The main focus of this activity is to assist children in developing the sense of touch.

Challenge: The children will use their sense of touch to match the physical characteristics of specific materials or objects on a poster board with the same items in a bag. It is not necessary for the children to know the names of the materials or objects on the poster board.

Materials and Equipment:

1 "feely board" (Construction procedures follow this activity.)
1 grocery bag or similar object

How-To-Do-It: (Have the children work in pairs to conduct this activity.)

1. Demonstrate the use of the feely board to the children:

    a. One child should hold the bag.

    b. The other child touches one of the materials/objects on the board and tries to find the same item in the bag.

        (The same materials/objects present on the board are in the bag.)

    c. When the child thinks a match is made, he/she removes the material/object from the bag.

    d. After this item is compared to the one on the board, it is returned to the bag.

    e. The same procedure is used for all six items on the board. The child who is holding the bag could keep track of how many correct matches are made. The children reverse roles after six attempts.

Further Challenges: Shape recognition could be done using a similar procedure. Instead of a board, two matching sets of geometric shapes could be made out of cardboard (or purchased commercially). Put one set in a bag (or box) and the other set in a place where they are visible to the children. Have the children feel the shapes in the bag or box and locate the same object from the other set. (The children could also be asked to describe the shape they have selected in the bag before they attempt to match it with the object outside the bag.)

Construction of the Feely Board

Materials and Equipment:

Glue
1 poster board
6 pieces of poster board or cardboard (10 cm x 10 cm)
Different materials/objects (i.e., sandpaper, scouring pads, soft fur-like material, small pieces of wood, a piece of felt, a piece of corduroy, etc.)
Scissors

Procedure:

1. Obtain six pairs of different materials/objects.

2. Cut them to fit on a poster board (about 10 cm x 10 cm).

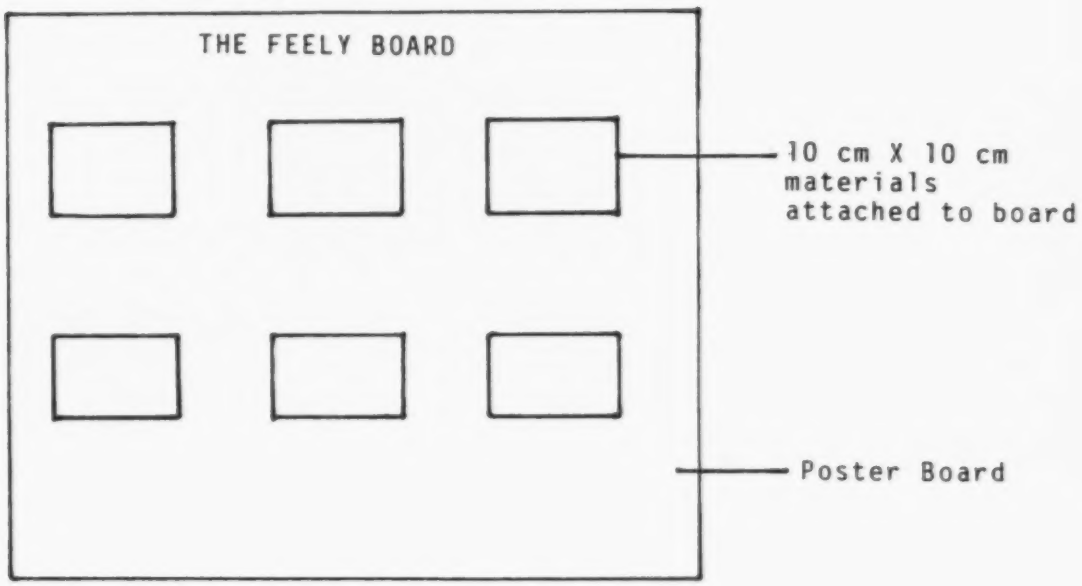
3. Glue one set of materials/objects on the poster board (figure 1).

4. Cut pieces of cardboard or poster board (10 cm x 10 cm) to serve as backing for the other set of materials/objects.

5. Glue the second set on the pieces of cardboard or poster board.

6. Put this set in a paper bag.

7. Locate the feely board and bag in a place that is readily accessible to the children.



TOUCHY FEELY WALK

by L. Janet Lee

Focus: Discovering the environment can be an exciting venture. Individuals do not become aware of objects found in their immediate environment merely because they have sense organs. Many persons look but do not see. They become aware of the environment to the degree they are afforded the opportunities for careful observation.

Challenge: Children will become more aware of the environment by applying their senses to its various parts.

Materials and Equipment:

This activity can be done on the schoolyard, park, playground, or any small area outdoors.
collecting bags (optional)

How-To-Do-It: During a walk outside, the children can look for objects relating to each topic which can be described using the words below. Use only one or two per walk. Older children might want to make collections, but stress to them not to pick living things, only non-living things and only after permission has been received for the given area.

1. TEXTURE	2. SHAPE	3. TEMPERATURE	4. SIZE
slick	small	hot	large
hard	large	cold	small
rough	oval	damp	tall
soft	round	clammy	short
slimy	oblong	moist	thick
coarse	long	dry	heavy
stiff	pointed	wet	miniature
ribbed	triangular	cool	etc.
hairy	square	etc.	
furry	rectangular		
etc.	etc.		

Further Challenges: A variation to such a walk would be to do a color walk. The children collect objects of different colors (the color of the day could be a starting color). The objects can be glued to a tagboard to make classroom color charts that the children helped to make. Touchy Feely cards can be made using objects found on the walk.

IT'S IN THE BAG

by Charles R. Barman

Focus: In this activity, children will use their sense of touch to identify different large and small objects in a bag.

Challenge: As the children select objects from a bag using only their sense of touch, they will describe the physical features of each one. Based upon this description, their classmates will attempt to determine what each object is.

Materials and Equipment:

One or more paper grocery bags or similar containers. A variety of large and small objects (one large and one small object for each child in class). Preparation - Select a variety of large and small objects. (Choose items that are consistent with the experiential backgrounds of the children.) Place the objects in one or more large paper bags or similar containers. Shape the opening(s) so that a child can reach into the container(s) without seeing directly in them.

How-To-Do-It:

1. Have the children sit in a circle. Position yourself in the center of the circle with the bag of objects.

2. Ask one child to come to the center of the circle and reach into the bag.

3. While reaching into the bag, ask the child to locate a large object.

4. Before the object is removed from the bag, have the child describe it. The rest of the class is to try to guess what the object is, based upon the child's description.

5. Have the same child repeat steps 3 and 4. This time, however, have the child find a small object.

6. Steps 2 through 5 should be repeated for each child in class.

Further Challenge: Have the children arrange the large and small objects into two groups. You could also ask them to order the objects in each group, beginning with the largest one and ending with the smallest.

GREEN GOO

by Betty Crocker

Focus: Although observations can and should be made using all five of our senses (always ask permission before you taste!), visual observations are used most often. When the other senses are not brought into play, we lose important information that aids in forming inferences and predictions.

Challenge: What can we learn using each of our senses alone? What can we learn by combining our senses? How do our observations affect our inferences? How do our observations affect the predictions we make? What role does past experience play in our inferences and predictions?

Materials and Equipment:

1 box of cornstarch
12 oz. of water
Few drops of food coloring
Flavoring extracts such as oil of cinnamon or clove
Strong wooden spoon
Large bowl for mixing
Covered container for storage in refrigerator
Clear plastic wrap
Waxed paper
Aluminum foil
Brown wrapping paper
Paper towels
Blindfolds for the students

How-To-Do-It: The night before, mix the drops of food coloring with the 12 oz. of water to make a very deep-toned liquid. For a nice deep green color, use four drops of blue, four drops of green, and four drops of yellow. Place the entire box of cornstarch in a bowl and add the colored water slowly, stirring as the water is added. It is hard to stir, so a bowl that is very large and a strong wooden spoon helps. It is easier to add extra water than to thicken it after too much water has been added. Cover and refrigerate overnight. Add flavoring or scent the next day just before using. Choose an unexpected flavor. Since the pale green color appears "minty," use something unexpected, such as clove or coconut. Green Goo can be made in any color you like, but I do not recommend yellow. The yellow you achieve prevents children from freely touching it and tasting it -- it is totally out of the question! Pink and purple are both effective colors.

In Class: Place paper towels on the tables and put a sheet of waxed paper on top of the paper towel. (The waxed paper allows the water in Green Goo to leach through and be absorbed by the paper towel. As the child works, suddenly the Green Goo dries out and becomes crumbly instead of a very thick liquid.) Seat the children at the table and have them put on their blindfolds. For safety, children must stay seated while blindfolded.

Place a spoonful of Green Goo on the waxed paper and have the children tell each other about its smell (...it smells good...it smells like candy...it smells like mouthwash...) and any noise they hear (...it crinkles as I move it...the paper makes the noise...) as they are working with it.

Also, use touch as an isolated sense (...doesn't feel wet...feels powdery ...feels smooth...). The blindfold helps focus observations using the nose, ears and skin, but is not necessary.

Remove the blindfold and collect observations using sight, touch again, and taste. Emphasize that tasting is not done unless they are told that it is safe to taste.

The lists of observations could be classified according to the sense used to collect it and extended as much as possible by the group. Noise observations will involve the sound of the various papers as they move Green Goo.

Have the children infer the ingredients used to make Green Goo. As a hint, tell them, "There are more than two but less than six ingredients, and all are commonly found in the kitchen." As they guess the ingredients, have them say why they think that is an ingredient. (Coconut because it smells like my sister's suntan oil. Flour because it tastes like flour and leaves a white powder on my hands.)

Clean-up of this activity is very easy. All that needs to be done is to wad the paper around the Green Goo and drop it all in the trashcan. The children don't even need to wash the residue off their hands as they are not sticky or messy. Green Goo residue is a white powder that feels much like baby powder.

Further Challenges: After observations and inferences have been made about Green Goo, students are ready to make predictions about Green Goo under different conditions and to plan ways to test their predictions. Will it act differently if you get it cold? What happens when you leave it in the sun for an hour?

References:

Abraham, Eugene, and Ronald J. Moglia. "Oobleck," Science and Children, March, 1973, p. 6.

Barrow, Lloyd H. A Presentation of the Regional National Science Teachers Association Convention, Charlotte, North Carolina, November 9, 1984.

THE SENSORY TUNNEL

by Leon Ukens

Focus: Looking at the world through rose-colored glasses, or other colors for that matter, will give children a new view on some familiar items. This, accompanied with the opportunity to utilize the senses on a myriad of other objects, will provide the child with an opportunity to communicate what they see, feel, hear, and smell. All of this will occur in a specially constructed cardboard tunnel.

Challenge: The children will describe their experiences during and after crawling through a cardboard tunnel. What kinds of observations can be made? How does looking at objects in red, blue, or green light affect the way they look?

Materials and Equipment:

Several large cardboard boxes, such as refrigerator boxes
Colored cellophane - red, blue, and green work especially well
Carpet of various textures
Other selected items for stimulating the senses - be creative

How-To-Do-It: First of all, the teacher needs to construct a tunnel out of cardboard refrigerator boxes. You can get these from local appliance stores. The longer the tunnel, the more fun for the children. The boxes need to be fastened end to end so that no light can get in. Making the boxes into a T or L shape is an interesting variation. BE CAREFUL - Children tend to get excited with this activity and many times will lean on the box tunnel, collapsing it on children inside. Make provisions so this does not happen. Reinforcing the tunnel may help or place it near a wall. Inside the tunnel, place various objects that will stimulate the child's senses. For example, you can use various kinds of textured carpet on the floor or hang a variety of items from the ceiling that will make noise when touched. Be creative with what goes inside the tunnel. Just make sure it is safe.

Next, cut small openings in the top and/or side of the box tunnel and cover these with colored cellophane. Dark colors work nicely. The colored light coming inside the tunnel produces an interesting effect on the sense of sight.

Further Challenges: If the children can recognize their names, a special touch is to write each child's name somewhere inside the tunnel. Use magic marker. Challenge the children to find their names.

References:

McCormack, Alan J. "The Mystery Tunnel," Science and Children, 11(6):14-16. March, 1974.

See Activity "Colored Light" by Foster elsewhere in this Sourcebook.

NOW YOU SEE IT! NOW YOU DON'T!....A STUDY OF CHANGE

by Bonnie Barr

Focus: Change is perhaps the single most constant feature of the universe. Describing properties before and after a change is the first step in classifying or seeing patterns in change. Change may be reversible or irreversible. Some changes which appear irreversible can be reversed using special methods and materials.

Challenge: What are the properties of a ball of clay? What properties can be changed? Are these changes reversible or irreversible? How do colors change when they are mixed? Is it possible to reverse the color change using special methods and materials?

Materials and Equipment:

Two small pieces of clay per child
Paper towel
Green and orange water soluble magic markers
Toothpicks
Baby food jars

How-To-Do-It:

1. Give each child a piece of clay about 1/2" in diameter. Ask the children to make a ball with their piece of clay. Ask the children to describe the clay. What color is it? How does it feel? How do your hands feel after molding the ball? How does the clay smell? What is its texture? Does it roll? In how many directions will it roll? Will it bounce?

Ask the children to describe how they might change the clay ball. Can they change its shape? Its size? Its texture? Its ability to roll? Its ability to bounce? Have the children change a property of their clay ball. Ask the children if they could change the clay ball back to the way it was. Have them do so. Tell the children that this type of change is called a reversible change. Develop the word reversible in relationship to familiar things, such as reverse gear in a car, a reversible coat, reversible dolls, Superman.

Have the children put the first ball of clay to one side. Give each child a second ball of clay of about the same size as the first, but of a different color. Ask the children to make a ball from the second piece of clay. Have them describe the properties of the new ball. How are the properties of this ball similar to the properties of the first ball? How are they different (color and maybe size)? Ask the children how they might change the properties of the new clay ball. Have them change a property. Ask them if they can make the clay look like it did before they changed it. Ask the children to name the type of change that was made in the clay (reversible).

Now, have the children mix the two balls of clay together to make a new ball. Have the children describe how this ball is similar to the other balls. How has the ball changed (size and color)? Is it possible to make two smaller balls from the one big ball? Have the children do it. Then have them join the balls into a big ball again. Ask the children to name the type of change that they just made in the clay (reversible). Now, ask the children to make from the big ball of clay two smaller balls of clay of the same color as the original balls. Of course, it cannot be done. Tell the children that this type of change is called an irreversible change.

2. Give each child a six-inch square of white construction paper. Have the children fold their paper in half and then place it flat on the table before them. With a medicine dropper, add several drops of red, yellow, and blue tempera paint to each child's square of paper. Ask the children to name the colors. Then have the children fold the papers along the crease and gently rub the paper.

Have the children open up the paper. Ask the children how the red, yellow, and blue colors were changed by mixing. Have the children name the colors they can now see on their paper. If you ask the children to name the type of change that took place, they will likely say, "Irreversible."

Tell the children that sometimes changes that seem to be irreversible can be reversible if you do special things to it. One of the jobs of a scientist is to know the special things to do that cause the changes. Give each child a strip (1" x 4") of paper towel or coffee filter paper. About 1/2" from the bottom of each strip, using water soluble magic markers, place either an orange or green dot. Place about 1/4" of water in enough baby jars for each child. Place a toothpick in the top of each strip of paper so that, when the paper is suspended into the jar, the bottom edge of the paper touches the water but not the dot. Suspend the strips into the water.

Water will be absorbed by the paper and dissolve the materials that produce the color. Some color pigments are heavier (more dense) than others. The lighter (less dense) pigments appear higher on the strip of paper. The green dot separates into blue and yellow spots with the blue spot being highest on the paper. The orange dot separates into a pink and yellow spot with the yellow spot being highest on the paper.

Ask the children to describe the type of change that took place when yellow and blue paint made a green color. And then this green color was separated into blue and yellow again. Remind the children that the change could only be done because they did something special to make it happen.

Further Challenges: Give each child a five-inch circle of paper towel or coffee filter. Scatter drops of red, yellow, and blue tempera paint (or food coloring) across the circle. Fold the circle to make a cone. Stick the point of the cone in the water in the baby food jar. As the water moves through the paper, the colors mix to form secondary colors. When a nice color blend has formed, remove the paper and allow it to dry. Have the children trace on the colored circle the shape of a leaf. Cut out the paper leaves and with string fasten them to a leafless twig. Presto...a tree with fall leaves.

Reference:

Teacher's Guide for Changes. St. Louis: Webster Division, McGraw-Hill Book Co., 1976.

PILE IT HERE 'N THERE

by Gerald Wm. Foster

Focus: This activity will give children an opportunity to experience classification. Children can make pictures, chains of objects, or sort materials into piles that have similar characteristics. Keep in mind that very young children will tend to focus on only one variable at a time.

Challenge: The children can be asked to see what they can do with the objects they are given.

Materials and Equipment:

Each child should have a set of objects that contains at least 50 pieces. There should be at least three different characteristics, such as shape, size, color. The following are examples:

- Buttons
- Feathers
- Toy animals, cars, planes, boats, creatures, etc.
- Bean seeds
- Keys
- Lids
- Combs
- Jewelry
- Macaroni of various types
- Washers
- Thread spools
- Nuts and bolts
- Geometric paper figures (squares, triangles, and circles)
- Rubber bands
- Material swatches

These materials can be stored in Zip-loc bags or margarine tubs.

How-To-Do-It: Give each child a set of objects and ask them to see what they can find out about them. Each child should work alone. The child can take the bag of objects and dump them out on the floor when ready to work. Depending upon the level of the child, several outcomes can be expected. A child new to the experience may begin putting objects together with no particular characteristics, while others may make long trains of similar objects or make some kind of picture from all of the objects. These are all pre-classification activities. When a child begins putting objects into piles because they have similar characteristics, they are beginning to experience classification. The children can work on this activity as long as they want, depending upon their interest. They can try other sets of objects.

Further Challenges: If children are able to make piles based on characteristics, you might want to ask them if they can make more piles or less piles then they have. Or you might ask if there are other ways to put the objects into piles.

Reference:

Phillips, Darrel G. Sciencing: Towards Logical Thinking. Science Education Center, Univeristy of Iowa, Iowa City, 1981.

FALLEN BRANCHES

by David Williams

Focus: An activity to help children to develop their skills of observing, space relationships, and classifying.

Challenges:

1) Children sort pieces of tree branches that "belong together."

2) Branches that "belong together" are joined to reconstruct each branch in its form before it was cut.

3) Children describe the similarities and differences of the branches.

4) Children state reasons for putting branches together--as sets and in order to reconstruct each branch.

Materials and Equipment:

Tree branches, approximately 3-7 cm in diameter and cut into pieces approximately 20 cm in length. (Construction procedures follow this activity.)

How-To-Do-It: Provide the children with a cardboard box (cardboard shipping boxes for ditto paper, mimeograph paper, or copy machine paper are ideal, especially if they have a lid) containing the pieces of two or three different tree branches. (Branches may be from the same tree, but they should be different; e.g., different diameters, differing states of preservation.)

1. Before this activity, conduct a field trip in the schoolyard or the school neighborhood to observe and then name the characteristics of trees and their visible parts; i.e., trunk, bark, leaves, branches, limbs.

2. Direct a child to dump the box of pieces of branches on the floor (or on the ground if you are conducting this activity outside).

3. Direct the children, or a child, to put the pieces that are alike, or sets of pieces that belong together, into piles.

4. Direct the child or children to state their reason for putting the pieces in the respective piles. (As young children begin this activity, they may create piles based on a characteristic other than the diameter and "texture" of the bark or the weathered color of the wood. Accept their set or classification if they can explain and justify their procedure. Encourage them to find another way to sort the wood pieces.)

5. When they have separated the wood pieces into sets that do go together, that are from the same branch, suggest that they fit the pieces of one of the sets of pieces together to reconstruct the tree branch. Encourage them to verbalize their reasons for fitting individual pieces together; e.g., "See, this piece is rounded in shape and has this brown thing on it. This other piece is also rounded in shape and has a brown thing on it like the other one. See, they fit together."

6. Upon completion of the reconstruction, invite the child or children to reconstruct another branch.

7. The box of wood pieces may be placed in an easily accessible location for children. Encourage them to sort and reconstruct the branches when they are interested.

Further Challenges: Additional boxes of wood pieces may be added to the center or additional branches may be added to existing boxes. Older children or more cognitively mature children could be encouraged to try sorting the pieces by touch only. They could also be encouraged to reconstruct the sorted pieces by touch only.

References:

Elementary Science Study. Teacher's Guide for Budding Twigs. New York: Webster Division, McGraw-Hill Book Company, 1970.

Vande Visse, Ellen. "Tree Twig Puzzles," in Alan J. McCormack (Ed.) Outdoor Areas as Learning Laboratories-CESI Sourcebook, ERIC Clearinghouse for Science, Mathematics, and Environmental Education, The Ohio State University, Columbus, December, 1979.

Construction Procedures for Fallen Branches

Branches should be dry, solid, approximately 3 to 5 cm in diameter (for easy manipulation), and about one to one-and-one-half meters in length. They may be branches found on the ground, i.e., fallen branches, or they may be branches that have been pruned from trees. Pruned or fallen branches picked up after a storm should be allowed to air dry for at least three or four months.

(If freshly pruned or fallen branches are used, they will dry out and crack which will give false clues to children as they reconstruct the branches.)

For smooth cuts, it is recommended that a band saw be used. (A band saw is a powered saw. If there is no neighborhood availability to a band saw, visit a local secondary school woodshop and seek assistance from the shop teacher to help you with the sawing.)

Cross-cut the branches in lengths of approximately 20 cm. Some of the cuts should be made with the blade of the saw perpendicular to the branch. Other cuts should be made with the branch at an angle to the band saw blade. The perpendicular cuts will produce end pieces that are circular in shape.

The angular cuts will produce end pieces which are elliptical in shape. The smaller the angle, the closer the end shape will be to a circle. The more angular the cut, the longer the major axis of the ellipse. (As children put the pieces together, they will see that the shapes of the ends of the pieces are not all the same even though they look the same.)

Safety Note: Although the band saw is a saw which is easy to use, be sure to wear safety goggles. Watch your fingers. Do not wear loose clothing while operating the saw. Long hair should be tied in the back of your head. (Request instructions for the proper use of the band saw.)

ANIMAL AND FLOWER PUZZLES

by David Williams

Focus: To help children to develop their skills of observing, space relationships, and classifying.

Challenge: The children can complete the puzzles by putting pieces together that go together.

Materials and Equipment:

Puzzles made of pictures of flowers or animals adhered to quarter-inch hardwood plywood or matte board. (Construction procedures follow this activity.)

How-To-Do-It: Provide puzzle pieces to the children and direct them to make piles of pieces that go together and then to put the puzzles together. (Children will need to observe the pieces and to see that there are, for example, different birds and different sizes of the bird or birds. Therefore, they will need to make piles of the pieces that go together as they attempt to put the pieces together to reconstruct the birds.)

Further Challenges: The child may try reconstructing the "solved" puzzle when blindfolded. The pieces of two or more puzzles may be mixed. The child is to sort the pieces into their respective sets and then proceed to construct the solid piece. Move on to more complex puzzles.

Construction Procedures for Animal and Flower Puzzles

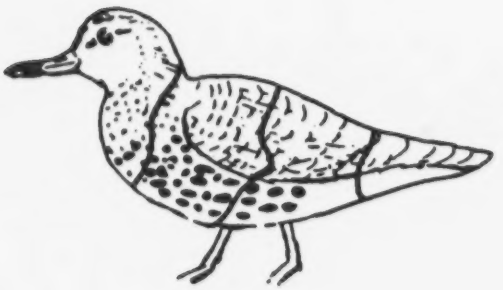
These puzzles can be made from pictures of flowers, fruit, vegetables, and birds or other animals which have been laminated and dry mounted on quarter-inch hardwood plywood or matte board. The pictures can be colored or black and white.

A sideview of a shorebird will be used as an example.

a) Select an appropriate drawing of a shorebird.

b) Make a reproduction of the selected bird with a copy machine.

c) With a pen or pencil, draw lines on the copied drawing to divide the bird into parts, the puzzle pieces (see illustration).



d) Make a copy of the copied drawing which has been reduced in size, e.g., reduced to 75% of the original size.

e) Laminate and then dry mount the two drawings to a piece of plywood or matte board.

f) Using a band saw with a 1/8th inch blade or a scroll saw, cut the shapes of the shorebirds from the plywood or matte board. (With fine-toothed blades, no sanding should be required.)

g) Following the lines (see "c" above), cut the bird into the puzzle pieces.

DON'T BURST MY BUBBLE!

by Linda Froschauer

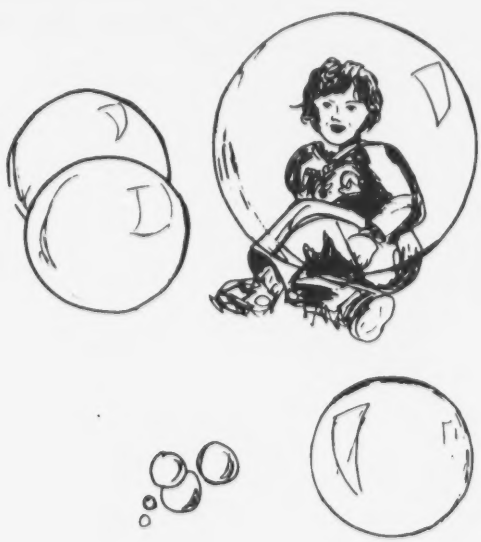
Focus: Through observation and manipulation, children will learn to compare size and shape. They will be able to discriminate between larger than and smaller than as well as round and not round. They will also notice a difference in colors, identifying those they know by name.

Challenge:

Are bubbles all clear?
Can you see colors in bubbles?
What colors can you see?
Can you make a larger bubble?
Can you make a smaller bubble?
Can you make a bubble that is a different shape?

Materials and Equipment:

Baby food jar with lid for each child
Water
High quality liquid dish detergent (the cheap stuff doesn't work nearly as well)
Glycerine (optional)
Thin, easily bent wire for each child
Drinking straw for each student - NOTE: paper straws may fall apart; you will want spares if you have paper ones
Tin cans with top and bottom removed; be sure there are no sharp edges on the rims - a variety of sizes (optional)
Deep bowl, cake pan, or bucket for each group
Old bath towels to use for mop-up



How-To-Do-It: A day or more before this activity, prepare the soap solution for the class. For a potent bubble solution, add four tablespoons of glycerine and four tablespoons of liquid detergent to a quart of water. Heat until warm, stirring continuously. Allow to cool. If you don't have glycerine, use eight tablespoons of liquid soap to one quart of water. You may make larger quantities and store this for a long time.

Place about an inch of solution in each of the baby food jars and secure the lids. Ask children to shake their jars and observe. Ask if all of the bubbles are clear. (No.) Ask what colors they can identify. (Some of the colors of the spectrum.) Hold the jars up to the light in the room and turn them. Can they see a change in color as the jar is turned? (Yes, some of the children may get the colors of the rainbow - Red, Orange, Yellow, Green, Blue, Indigo, Violet - although they will not be in that order.) Hold the jars up to the sunlight coming through the window. Are there different colors? (There may be.) Children like to keep these jars at their place, shake them, and observe periodically; you may want to label them with the names of the children and allow them to be taken home after many opportunities to observe their contents.

The following segments of this activity are very exciting for the children and will be noisy as well as messy. You may want to go outdoors on a nice day or cover the flooring with newspapers. Have several old bath towels around for mop-ups of spills and clean-up of desk/table tops.

Provide each team of two or three children with a shallow pan/bowl/bucket with an inch or two of soap solution in the bottom. Give each child a section of wire that has been formed into a loop. Allow them to blow bubbles using the loop and solution. Although many children will know how to do this, some may need to observe for a while or need your guidance. Once they have had an opportunity to play around with the bubble-making equipment, ask them what shape the bubbles are. (If you have formed perfect loops with the wire, they should be fairly round.) Ask children to try to make a bubble that is a different shape. (This can be done by changing the shape of the loop.)

Give each child a soda straw. Allow them to put the straw in the solution and blow out gently. Explain that they should be as close to the surface of the solution as possible; they really don't want to have their straw at the bottom of the pan. WARNING: Practice blowing OUT through the straw before doing this activity. Children can usually suck in through a straw fairly easily, but have had little practice in blowing out!! Ask them to see how big they can make a bubble using this method. Ask them to make the smallest bubble they can using this method. Have them dip the straw in the bubble solution and blow gently out into the air. (They may have difficulty actually getting a bubble using this method due to the size of the hole in the straw; you may want to try out your straws first.) Point out the biggest bubbles and the smallest bubbles to the class. You may want to ask how the children made their bubbles bigger or smaller.

Children can actually blow bubbles and keep them intact once they have landed if the surfaces are not dry. Table tops usually do get wet during the activity; it is best not to dry them off until the class is completely finished.

Further Challenges: Provide children with tin cans that have had the tops and bottoms removed. Tape edges of cans to be sure there are no sharp edges. Have them dip one end of the can into the solution and either blow into the other end or quickly move their hand to provide air flow. Compare the sizes/shapes of the bubbles produced by the tin cans.

Ask children to try to blow one bubble inside another bubble. This can most easily be done by using a straw in the pan of solution. It takes practice and patience.

Reference:

Zubrowski, Bernie. Bubbles: A Children's Museum Activity Book. Boston: Little, Brown and Company, 1979.

TILTING TRIANGLES AND SQUATTY SQUARES

by Bonnie Barr

Focus: All natural and man-made objects are composed of one or more geometrical shapes. Helping children recognize these shapes encourages the mental manipulation of standard forms to create meaningful patterns.

Challenge: What shapes can be found in common everyday objects? Which shapes tend to be the most common in natural objects? In man-made objects? Which shapes are most often found together? What shape is the most common in large objects? Small objects? What shape is the most common in rolling objects? Flying objects? Sailing objects? What shape is most common in buildings? Bridges? Skeletons?

Materials and Equipment:

Geometric shapes cut out of paper
Leaves from a variety of different types of trees
Full page pictures from magazines
Crayons

How-To-Do-It: Give the children paper cut-outs of a full and half circle. Ask them to fold the big piece so that it looks like the smaller piece. Have them see if there is more than one way to do this.

Repeat the above procedure using a square and a triangle and a square and a rectangle. See if they can make a triangle from a rectangle.

Give each pair of children a collection of leaves taken from a variety of different trees. Ask them to group the leaves with similar shapes together. Hold up, one at a time, a paper cut-out of a heart, fan, oval, or circle. Have the children hold up leaves that are shaped like each of the cut-outs you are holding.

Give each child a full page magazine picture. Give each child either a red, blue, or green crayon. Have the children with the red crayons put an X on all the circles in their picture. Children with blue crayons are to mark the squares in their pictures, and the children with green crayons are asked to mark the triangles. Look at each child's work individually and discuss it with them.

Further Challenges: Have children locate different shapes on their clothing; i.e., buttons, pockets, yokes, etc. Have children walk around an imaginary geometric shape. Have children view paintings by surrealistic artists, such as Salvador Dali. What shapes can they find in the paintings? How do the shapes of the objects in the paintings differ from the shapes of the objects in real life?

MERRILY WE ROLL ALONG

by Deborah Ozdowski

Focus: This activity will enable children to recognize various geometric shapes around the classroom and/or in other places in daily life.

Challenge: What shapes can a child discover in the environment that match those on a cube?

Materials and Equipment:

Cardboard milk carton, $\frac{1}{2}$ gallon size
Scissors
Colored contact paper
Masking tape
Various stickers (if desired)
Various materials that make sounds when shaken (if desired)
Colored edging tape

How-To-Do-It:

1. Measure one side of bottom of milk carton. Using this measurement, measure up the side of the milk carton. Draw a line at this height around the outside of the carton. Cut the carton at this line.

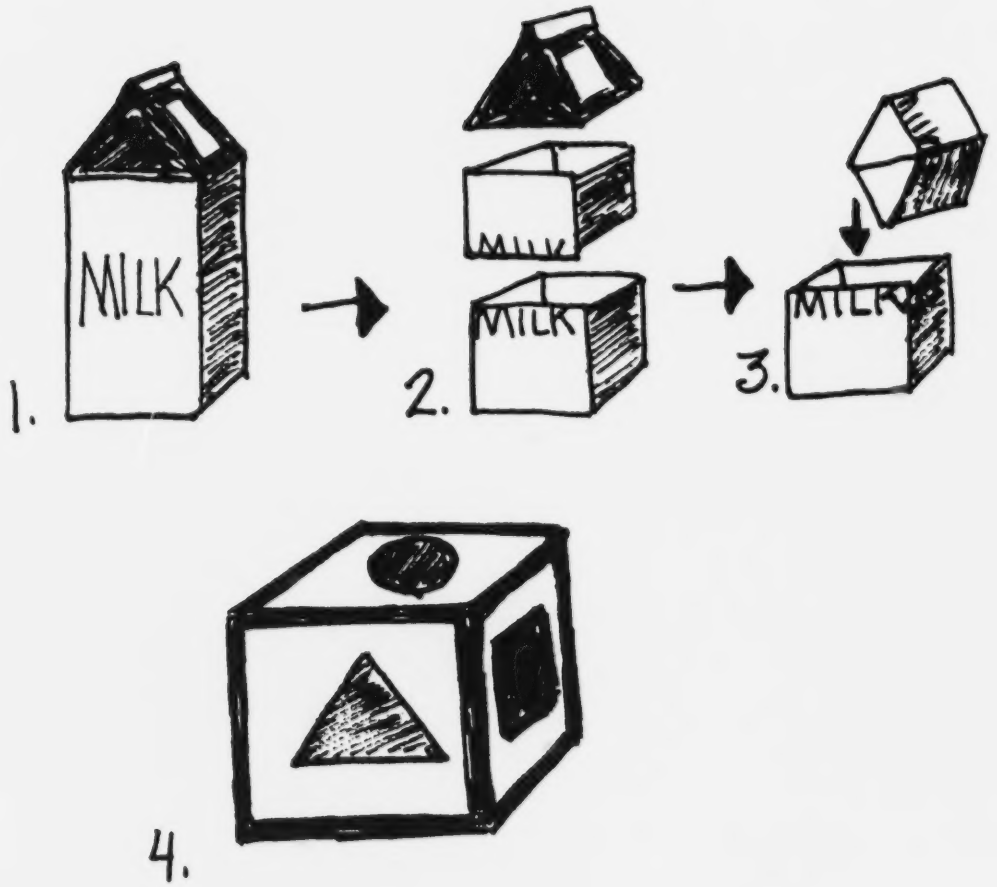
2. Using the same measurement, measure another segment of carton and cut around all four sides of the remaining carton. You should now have a lower segement of carton (with bottom of carton still intact) and another segment of carton with an open top and bottom.

3. Place the open-ended segment of carton inside the other section so that a complete cube is formed. Using masking tape, tape around all edges of cube.

4. Cover sides of your die with colored contact paper and seal edges with plastic edging tape.

You now have a die. Any figures, numbers, etc. may be placed on the sides with stickers, markers, etc.

Optional: You may put some bells, beans, rice, or various other materials inside the die so that sounds are made when the die is rolled.



In this lesson, colored contact paper is cut into various geometric shapes (triangles, squares, circles, rectangles, etc.) and the shapes are stuck onto the sides of the die. The children will take turns rolling the die. Each child must look at the geometric shape rolled and, looking around the room, find that shape in the room.

Further Challenges: The cube can be used as an aid in games which help children to recognize colors, sizes, numbers, words, or letters. Two dice can be made so that the children will be "working" to find items demonstrating two attributes in the game; i.e., a yellow square, a red circle, etc.

Another idea would be to put faces demonstrating various emotions on the sides of the die, and the children must mimic the facial expression or act out a scene demonstrating that emotion.

Reference:

The author wishes to thank Patricia Waters, Early Childhood Education Department, Towson State University, for this idea.

CORK 'N PRINT

by Gerald Wm. Foster

Focus: Children will experience spatial relations by transposing alphabet letters from individual rubber stamps to paper. They will have to determine the position the stamp must be in to make it appear the correct way to read the letter. Children who have had no experience with letters could begin by making pictures.

Challenge: Can you make a picture with the alphabet letters? Can you make a word with your alphabet letters? Can you make certain alphabet letters from other alphabet letters?

Materials and Equipment:

Raised rubber letters - from department stores, art supply stores, etc.
Elmer's glue
Corks
Zip-loc bags or margarine tubs
Washable ink
Stamp pad
Smock
White paper
Newspaper

How-To-Do-It: Glue the raised rubber letters onto separate corks. Give each child a set of letters and an ink pad with washable ink. Spread out newspaper for each child to have on the work area. Tell the child the printing is to be done only on the white paper and not on anything else. Each child should wear a smock to protect clothing. Have the children begin by asking what they can determine by stamping the paper with the letters.

Each child should work individually.

Washable ink is advisable because they will probably get the ink on their skin as well as the smock.

As was stated before, children who haven't any experience with making words will probably make new words or letters from other letters.

This activity has no stopping point, so the teacher can allow the child to work with this activity using some of the extensions listed below.

Further Challenges: Teacher can cut out shapes and letters in vegetables, such as carrots and potatoes, for the children to use as stamps. Clay can also be used. Mirrors can be put next to their printing work to see what images are formed in the mirror.

Reference:

Phillips, Darrel G. Sciencing: Towards Logical Thinking. Science Education Center, University of Iowa, Iow City, 1981.

CHAPTER III

LIFE SCIENCE ACTIVITIES

BAGARARIUMS

by Charles R. Barman

Focus: Just as aquaria and terraria allow for the observation of water life and terrestrial life, this activity is designed to provide an opportunity for children to observe the growth of a plant.

Challenge: Children will examine the changes that occur in a bean seed as it germinates and, subsequently, develops roots and a shoot. In addition, the children will observe how the roots and shoot grow into a new plant.

Materials and Equipment:

A pack of bush bean seeds
Paper towels
Zip-loc sandwich bags
Water
Hand magnifier (one for every two students)
Paper cups
Potting soil

How-To-Do-It: (This activity will take several weeks to complete.)

Part I

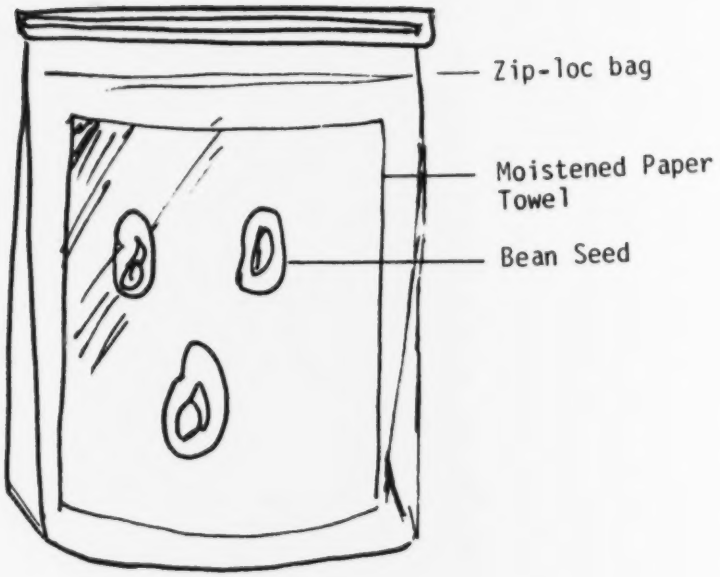
1. Have the children work in pairs. With a magnifying glass, ask them to examine a few bean seeds. Ask: How does the seed look? How does it feel? If you wanted this seed to grow, what would you need to do to help it grow?

2. After they have examined the seeds, have each child fold a paper towel to fit into a Zip-loc sandwich bag.

3. Before putting the towel into the bag, ask the children to moisten it. (Have them dip the towel in water and wring it out so that it is moist but not oversaturated.)

4. Have them put the moistened towel into the Zip-loc bag. Place 2-3 bean seeds in the bag and seal it (Figure 6).

5. The bags should be placed in areas visible to the children, but not in direct sunlight (i.e., tacked to a bulletin board, placed on a table, etc.).



6. Have the children examine the bean seeds every day. Germination should occur in about 7-10 days. When germination occurs, ask the children to identify any changes they observe in the seeds. (Roots and a shoot will begin to grow. Small root hairs will also appear on the roots. The function of the root hairs is to absorb water and minerals into the plant.)

Part II

1. After the children have made observations of the developing roots and shoot, have them plant the germinating seed.

Each child should:

a) Add potting soil to a paper cup until it is about 3/4 full.

b) Put the germinating seed in the potting soil. It should be placed about 2 cm under the soil.

c) Add a small amount of water to the cup. (Make sure that the children do not overwater the seeds.)

2. Have the children water the plants every other day. In addition, ask them to examine their cup for any evidence of growth. These observations should be made until the bean plant has a well-developed stem and leaves. Some of the plants may produce flowers, which will develop into new seeds.

Further Challenges: Allow the children to take their plants home. If this activity is conducted in the spring, they could be encouraged to have an adult assist them in transplanting the plant in an outside garden. Be sure to tell the children that an outside plant may also need water periodically.

MR. POTATO HEAD

by Thomas E. Thompson

Focus: Germination is the way a seed begins to grow into a plant. The resulting sprouts are rich in nutrient value for humans. In this activity, children will observe the germination of selected seeds and their growth into an edible food, and they will measure the length of time for different seeds to germinate.

Challenge: Growing an edible plant usually requires considerable time. "Immediate" results are essential to hold the interest of young children. Therefore, the challenge is to grow a plant in a relatively short period of time. Sprouts serve this purpose by germinating quickly.

Materials and Equipment:

Sprouts ... alfalfa, garden cress, crispy mix packet, mustard greens
Potatoes
Cotton batting
Spoon
Glue
Styrofoam cups
Assorted items for making a face on the potato: i.e., bottle caps, straight pins, buttons, corks, and other materials

How-To-Do-It: Mediums for germinating seeds are quite varied. Some of the more common ones include terry towels, sponges, paper towels, flannel, and cotton batting. (Soil is also good, but because the seeds are "hidden," it is excluded from this list.) A successful medium must be one which can absorb and hold moisture for extended periods of time. The skills and concepts can be easily taught using any of the above mediums. However, to make this activity more interesting, the construction of a potato head with cotton batting has been selected.

Due to the availability of materials, it is recommended that each child construct his/her own potato head. If the sprouts are not consumed, Mr. Potato Head could be taken home as a gift to Mom and Dad.

Scoop out a hole from the top of a large potato. Fill the hole with moist cotton. To make a funny face, push in bottle caps or use straight pins and glue to attach corks, buttons, and other materials. Sprinkle quick-growing seeds, such as cress, alfalfa, crispy mix or mustard greens, on the cotton. The potato can be held in an upright position by constructing a stand from a styrofoam cup. Cut the cup in half and use the bottom portion as a holder. Keep the cotton moist. In a few days sprouts will appear. As the sprouts grow, trim them and use in salads or sandwiches. Your crop should last a week or more. If the sprouts are harvested for consumption, Mr. Potato head has the appearance of a man with a flat-top haircut.

By using a variety of seeds, comparisons can be made to illustrate the concept that different seeds require different lengths of time to germinate.

As a point of information, most of the seeds used in this activity are high in the minerals calcium, potassium, and phosphorus, and also rich in the vitamins A, C, D, E, K, and B_8.

Further Challenges:

1) Discover other ways that sprouts can be eaten as a nutritional snack for children.

2) Comparisons can be made between different mediums as a source for germinating seeds.

SEEDS OF LEARNING

by Mary Rita Brady

Focus: This is a series of activities designed to expand children's knowledge of seeds beyond that required to grow a lima bean plant. Included are concepts involving similarities and differences among seeds, seeds used as food, seed embryology, and sources of seeds. The five activities described should be taught on five consecutive days to capitalize on interests and motivation aroused by the discoveries made during the first activity.

DAY 1

Challenge: Are all seeds alike?

Materials and Equipment:

For each child:

1 hand lens
1 paper towel

For each group of 3-4 children:

A tray containing an assortment of fruits and vegetables cut into sections. The following provide a good representation of seed types:

Bell pepper
Banana
Orange or grapefruit
Apple (an apple, cut in half "around the equator," will reveal a five-pointed seed star)
Squash or zucchini
Watermelon
Strawberry
Grape

How-To-Do-It: (Children should wash their hands before beginning since some will taste the fruit and vegetables. Children should be cautioned that many of the seeds are not edible.) Ask children if they have ever planted a seed. Allow some children to describe their experiences. Do they think all seeds are alike? Explain that they will be observing some seeds to answer this question.

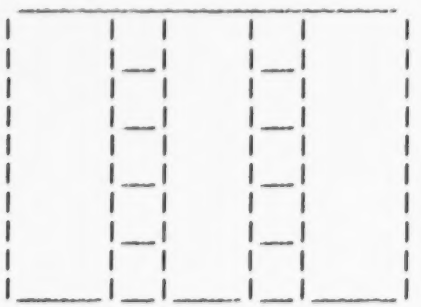
Groups of no more than 3 or 4 children should share a tray. Children should be instructed to focus the hand lens close to the object rather than close to their eyes. As children observe seeds, they should be encouraged to classify the seeds: edible - non-edible, large - small, shape, color, many - few, rough - smooth, etc. Also encourage children to verbalize

other observations; e.g., how seeds are arranged, how they are attached to the fruit, etc.

Children should recognize many of the differences among seeds and should develop at least one method for classifying the seeds they have observed.

Select a seed classification system, e.g., size, and develop a class bar graph. On a large sheet of poster board, draw two columns divided into equal squares. Label the columns Large and Small. Children should place one seed from each type of fruit or vegetable studied on the graph in the appropriate column. Compare. Did we have more large seeds or more small seeds?

Prepared graph poster



LARGE SMALL

Further Challenges: What seeds can you find at home? Ask each child to bring to school a seed from home. Allow time for each child to describe his seed, its origin, etc. Prepare a class display of seeds.

DAY 2

Challenge: Which seeds do we eat?

Materials and Equipment:

A group of edible seeds, including:

- Pumpkin seeds
- Sunflower seeds
- Nuts of various types
- Peas
- Corn
- Pomegranate

How-To-Do-It: Ask children if they know of someone who uses seeds for food. Some will know that animals eat seeds, but few will realize that people do. Tell the class that they will be tasting various types of seeds. Again, caution children that not all seeds are edible, and that they should consult a grown-up before eating an unknown seed.

If a pomegranate is available, do not permit children to handle it. Cut it open in front of the class and display the seeds. Explain to children that only the seeds of the pomegranate are eaten. Allow children to taste the seeds if they wish.

Children should wash their hands before eating the seeds.

Each of the children should have their own samples of seeds from which to choose those they want to eat.

As children eat seeds, discuss the type of covering each comes in and the type of plant each grows on. Display some seeds (e.g., nuts, peas) in their original covering.

Children will recognize that seeds are an important food source for people.

Further Challenges: What seeds can you find in the kitchen? Ask children to explore their kitchens at home (with parental assistance!) to locate edible seeds. If possible, samples should be brought to school.

DAY 3

Challenge: Where does a baby plant come from?

Materials and Equipment:

For each child:

1 lima bean seed. Seeds should be soaked in water overnight in an open container before use. Extra seeds should be available.
1 hand lens

How-To-Do-It: Ask children to speculate about where a baby plant comes from. Explain that they will see the baby plant "hidden" in a seed.

Each child should perform this activity individually.

Peel the seed coat off of the seed. Explain to the children that a seed coat performs many of the same functions that their own coat does. Discuss these functions.

Separate the two halves of the seed. Use the hand lens to observe the baby plant. Note small leaves. Explain to children that the baby plant will get food from the seed until it is big enough to make its own food.

Have the children pantomime a baby plant's actions as it pushes open the seed, breaks the seed coat, pushes its way up through the soil, and unfolds.

Further Challenges: Do all plants come from seeds? Explore other ways to start plants, such as bulbs, runners, cuttings, etc.

DAY 4

Challenge: Do small plants grow from small seeds?

Materials and Equipment:

For each child:

2 milk cartons or other planters
Potting soil
3 large (beans, peas) and 3 small (grass, radish) seeds

How-To-Do-It: Have a brief discussion with children to review the differences they observed in seeds. Are all seeds the same size? Can large plants grow from small seeds? Explain that they will experiment to find out.

Each child should do this activity individually.

Each child should put the same amount of soil in two milk cartons and make three holes of approximately the same depth in each carton. (To make holes, children can insert their forefingers into the soil up to the first knuckle.) Three small seeds should be planted in one container and three large seeds in the other. Containers should be watered with approximately the same amount of water and placed next to each other in a sunny spot. Children should observe containers each day and note differences in germination and growth rates and appearance of plants.

Children will recognize that not all baby plants look alike or grow at the same rate. Children will conclude that smaller seeds usually produce smaller plants.

After plants have grown, have a class discussion to summarize similarities and differences children have observed.

Further Challenges: Look at some other seeds. Describe how the baby plants will look. Plant the seeds and observe the plants to check your predictions.

DAY 5

Challenge: Where do seeds grow?

Materials and Equipment:

None. However, the teacher may want to make an advance trip to the area to determine whether it contains enough seeds to conduct the activity.

How-To-Do-It: Ask children to name some places that seeds grow. Tell them that they will be going on a seed scavenger hunt (on school grounds, in the neighborhood, at a park) to find seeds in the places they grow.

This can be a whole-group activity, although sufficient adults should accompany the children on the walk so that there is a ratio of one adult to five children.

As you walk about the area, identify grass seeds, wildflower seeds, dandelion seeds, pine cones, etc. Encourage children to find seeds also.

Collect seeds to take back to the classroom. (Be selective so as not to cause environmental damage.) Children can use them to decorate pictures, make collages, etc.

Further Challenges: Where else do seeds grow? Encourage children to collect other seeds in their yards, etc. to bring to school to add to class display.

References: Related experiences may be found in:

Teacher's Guide for Growing Seeds (Elementary Science Study). Nashau, NH: Delta Education, 1967.

Carin, Arthur A., and Robert B. Sund. Discovery Activities for Elementary Science. Columbus, OH: Charles E. Merrill Publishing Co., 1980.

LEAVES!!! LEAVES!!! LEAVES!!!

by Rowlee Miller

Focus: The skills of ordering and classifying are developed with these activities.

Challenge: The children are asked to sort leaves according to color and to place them in order from the largest to the smallest.

Materials and Equipment:

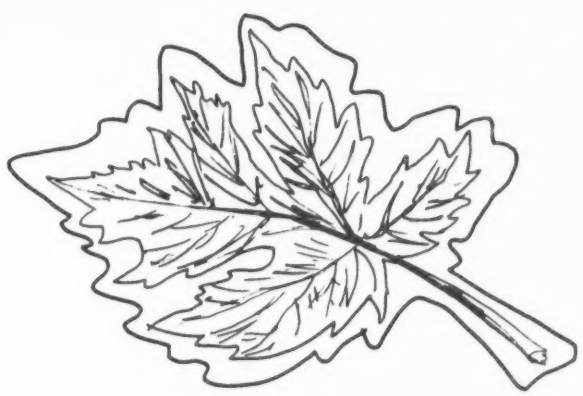
Laminating machine. Large assortment of brightly colored leaves. (Leaves of houseplants, vines, and shrubs can be used in addition to tree leaves.)

How-To-Do-It: This is a versatile activity. In regions of the country with brightly colored fall leaves, it may be done as part of the autumn study. In other areas, it can be done any time the skills of ordering and classifying are being taught.

Collect the leaves and place in a heavy book, such as a catalog. Make sure the leaves' edges are smooth. Allow them to dry overnight. Laminate and trim the leaves. They will remain usable for years.

There are several activities that can be done with the leaves. (1) The children can sort them according to color--red, orange, purple, green, etc. (2) They can count them. (3) Place in order from the biggest to the smallest. (4) Find the longest and the shortest. (5) Use them for language development. Have each student choose a favorite and tell why. Have the students describe them using as many terms as possible. If the leaves were collected on school property or in the neighborhood, take the children on a scavenger hunt to find the trees that match the leaves. (6) Let the children staple them together in long chains to decorate the room.

Further Challenges: Develop a "deck" of leaves with two of each kind. A form of "Concentration" can be played by matching the leaves.



STOP COOKING

by David R. Stronck

Focus: Foods will retain their highest levels of nutrition when they are eaten fresh, raw, and entire.

Challenge: Do children prefer to eat vegetables raw or cooked?

Materials and Equipment:

Stove or heating element
Pot or pan with water
Variety of vegetables, especially carrots, beets, and tomatoes
Knives
Spoons (may be plastic)

(For Further Challenge) seeds of vegetables and small plot of land

How-To-Do-It: Ideally, the children will grow their own vegetables by using a small plot of land. They can plant the seeds, water them, and harvest them. Carrots are especially hardy and thrive even at cool temperatures. Children usually take great interest in any vegetables that they can grow and tend to develop taste preferences from this interest.

Discuss with the children their likes and dislikes toward vegetables. Many children strongly dislike carrots and peas because they are often overcooked into a tasteless mush. In this activity, children are invited to eat such vegetables raw. They may discover that these same vegetables are delicious in the raw state.

Use the children as much as possible in washing and sorting out samples of the vegetables. For example, one child may be in charge of giving out samples of raw carrot sticks. Cook samples of each vegetable by boiling in water. These samples can be delivered to the children by using spoons. Encourage each child to eat a small piece of a raw vegetable, e.g., a pea, and the same as a cooked (boiled) vegetable. Do this for any convenient number of vegetables.

Conclude the activity with a discussion of preferences. Explain the nutritional advantages of NOT cooking. Americans tend to dislike vegetables especially because of traditional overcooking. Let the more adventuresome children lead the timid children into trying a variety of new tastes and developing new attitudes.

Further Challenges:

1) Plant a small vegetable garden that will be tended and observed by the children.

2) Keep raw vegetables in the classroom for eating by the children. Encourage such foods to replace junk foods; e.g., candy, doughnuts, etc.

TASTY DRIED MORSELS

by Charles R. Barman

Focus: The children will observe the food preservation technique known as dehydration. As they are introduced to this technique, they will observe the changes that occur to fruit as it dries.

Challenge: The children will examine the effectiveness of food dehydration by applying this technique to the preservation of apples and pears.

Materials and Equipment:

Cheesecloth
Kitchen knife
1 or more apples
1 or more pears
Hand magnifying glass
1 or more Zip-loc plastic storage bags
Scissors

The construction procedures for the "food drying tray" are listed following this activity.

How-To-Do-It: (This activity will take about three days.)
Please note: Items 1 through 6 should be done by the teacher. Prepare enough fruit so that some will be left over after every child has had a chance to taste one or more samples. The left-over samples will be stored in a plastic storage bag for a few weeks.

Please inform the children that they should wash and dry their hands before handling any of the food samples.

1. With a kitchen knife, peel the apple.

2. Cut the apple and pear into halves. Remove the core from each piece.

3. Slice the apple and pear into thin sections, about .5 to 1 cm thick.

4. Place the food drying tray in a sunny spot on four books or similar objects so that air can flow freely through the cheesecloth. (If there is no access to sunlight, a 100 watt incandescent light can be used to aid in the drying process. Position it about 60 cm from the food samples. Turn off the light at night.)

5. Put the food slices on the tray. Spread them around the tray so that they do not touch one another (Figure 10).

6. Cut another piece of cheesecloth large enough to cover all of the food slices. Place the cloth over the slices.

INVITE THE CHILDREN TO ASSIST IN THE FOLLOWING PROCEDURES:

7. Turn the slices every day so they will dry evenly. If the humidity is low and there is a sufficient amount of sunshine, the food slices should dry in about three days. (If an incandescent light is used, the drying process may be completed in less than three days.)

8. With a hand magnifying glass, observe the food samples each day. Ask the children if they observe any changes in the food samples from one day to the next.

9. When the fruit is dehydrated, allow each child to taste the samples.

10. Put a few samples in a plastic bag and store them in a dry place. After a few weeks, ask the children to examine and taste these food samples. This will demonstrate the effectiveness of the dehydration process in preserving the fruit.

Further Challenges: Bring additonal types of fresh and dried fruit into classroom. (Both may be obtained at your local grocery store or supermarket.) Invite the children to examine and taste the fresh and dried samples. Ask them if they can match the dried samples with the fresh ones.

Reference:

Stein, S.B. The Kids' Kitchen Takeover. New York: Workman Publishing Co., 1975.

Construction of a Food Drying Tray

Depending upon the number of children in class, more than one food drying tray may need to be constructed. A 50 cm by 30 cm tray will accommodate the slices from about two medium-sized apples and pears.

Materials and Equipment:

A cardboard box (50 cm long, 30 cm wide, and 10 cm or more in height)
Masking tape
Cheesecloth
Tool for cutting cardboard
Scissors

Procedure:

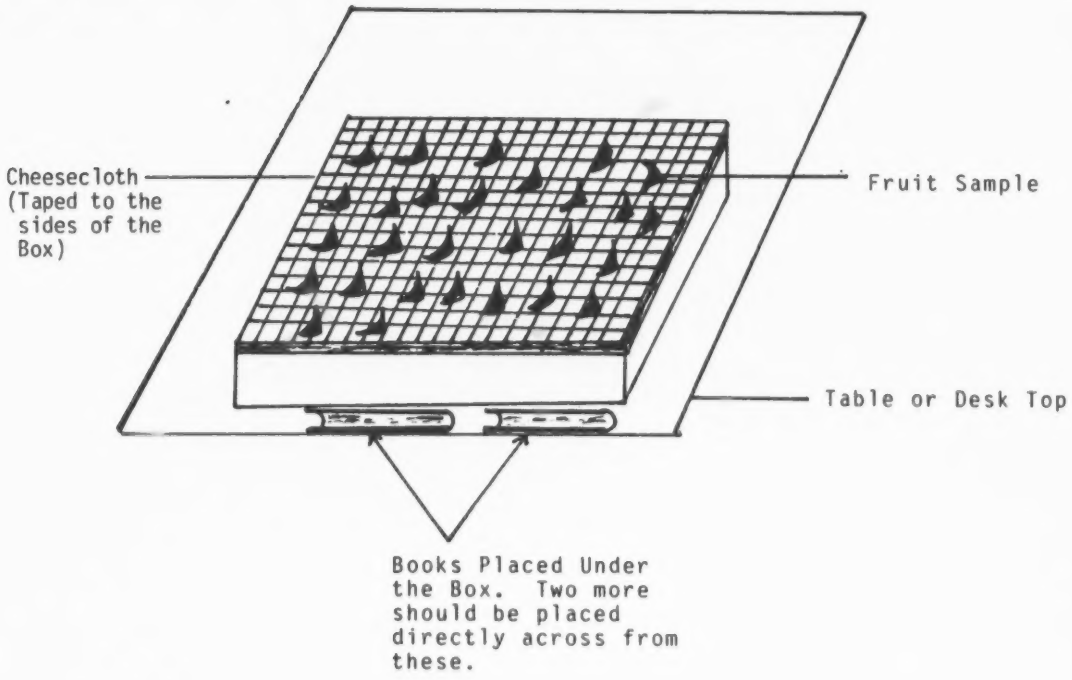
1. Remove the top from the cardboard box. (If the height of the box is 10 cm, also remove the bottom and omit steps 2 and 3.)

2. If the height of the box is over 10 cm, draw a 10 cm line on each side of the box.

3. With a cutting tool, such as an "Exacto Knife," cut the box along the line of each of its sides. This is the frame of the drying tray.

4. Cut a piece of cheesecloth so it will fit over the top of the frame.

5. Tape the cheesecloth to the frame. The food drying tray is now completed.


Cheesecloth (Taped to the sides of the Box)
Fruit Sample
Table or Desk Top
Books Placed Under the Box. Two more should be placed directly across from these.

"IT'S A ROCK...IT'S A DINOSAUR EGG...IT'S A BLUE HUBBARD SQUASH!?!"

by Lynne Kepler

Focus: Most children will not recognize a hubbard squash for what it is. So, based on their observations alone, children make guesses as to what exactly this large, bumpy blue thing is.

Challenge: What is this? Why do you think it is a _____?

Materials and Equipment:

1 Blue Hubbard Squash

How-To-Do-It: Set the squash on a classroom table where the children can easily make observations of it.

Leave the squash there for serveral days. During that time, collect observations and discuss "What do you think it is? Why?" "Is there anything inside?" "Is it alive?" "Where did it come from?"

After several days, gather the children around and ask them what might help them figure out what this object is.

Cut the squash open. "Now, what do you think this is?" (Most children will come up with "pumpkin" or "squash" once they see the seeds. They may also be a bit surprised to see the bright orange insides.)

Collect the seeds to roast or to dry and plant.

Further Challenges: Cut the insides into chunks. Cook and mash and have the children help in making (and eating) a quick bread.

Blue Hubbard Squash Bread

Sift together:	3 1/2 c flour	1 tsp cinnamon
	2 tsp baking soda	1 tsp nutmeg
	3 c sugar	1 1/2 tsp salt
Mix in:	1 c oil	2/3 c water
	4 eggs	2 c cooked squash

Bake in 2 large greased bread pans at 350° for one hour.

POP GOES THE JELL-O

by Elizabeth Partridge

Focus: The children will develop skills in predicting, observing, classifying, comparing, and graphing. They will also better understand food sources.

Challenge: Young children are often unaware of food sources and why certain physical changes take place during the cooking process. With this activity, the teacher will introduce food sources and physical change, and reinforce skills in observing, comparing, classifying, predicting and communicating.

Materials and Equipment:

Regular popcorn
Colored popcorn
Ear of corn
Miniature marshmallows
Margarine (2 sticks)
1 small package of Jell-O
Waxed paper
Colored markers
Popcorn popper
Hot plate
Saucepan (2qt.)
Large spoon
Large bowl
Clock or watch
Metric Measuring cup
Cooking oil (if needed)

How-To-Do-It; Show children a fresh cob of corn, regular popcorn, colored popcorn, and a picture of a cornfield. Discuss how corn is grown. Compare the fresh corn with the two types of popcorn. Discuss likenesses and differences. Give the children a small amount of colored popcorn and let them classify the kernels according to color.

Have children measure popcorn (if a standard popcorn popper is used, measure oil.) Discuss what safety precautions are taken when using electrical appliances and heated substances. Check the clock and have children predict how long it will take for the first kernel to pop. Also, have them predict how many liters of popcorn will pop. Note when the first kernel pops and compare to the prediction. While waiting for all popcorn to pop, discuss what makes it pop (moisture inside the kernal turns to steam and causes it to explode.)

After popcorn is popped, have them measure by liters how much popcorn popped and transfer it to a bowl. Note which prediction was the closest.

Turn on hot plate, reminding children of safety precautions. Have children measure margarine and put in 2 qt. saucepan. Let them predict what will happen to it when heat is applied. As margarine is melting, let them measure marshmallows and add them to the margarine. Again, have them predict what will happen to the marshmallows when heated. Review how heat changes things.

Have children add Jell-O to the mixture. Ask them what happens to the Jell-O as it is added. Introduce the word dissolve. Pour mixture over popcorn and let children shape into balls with well-buttered hands. Place on waxed paper to harden and then enjoy! (If done as a large group activity, give each child a piece of waxed paper and enough popcorn to form a ball.)

Further Challenges:

1) Make a language experience chart on where popcorn comes from and how it pops.

2) Make popcorn collages with dry tempera paint and popcorn.

3) Investigate how the American Indians introduced the Pilgrims to popcorn.

Recipe Chart: Jell-O Popcorn Balls

4 cups marshmallows (miniature)	(750 ml)
1/2 cup butter	(134 ml)
1 small package Jell-O	
4 quarts popped popcorn	(3.8 l)

Pop popcorn. Set aside. Melt butter in saucepan. Add marshmallows. Stir until melted. Add Jell-O. Stir until well mixed. Pour mixture over popcorn. Mix with well-buttered hands and form into balls. Cool and eat.

STONE SOUP

by Sheila M. Jasalovich

Focus: Learn about the vegetable members of the vegetables and fruit food group through children's literature and a cooking activity.

Challenge: Identify vegetables and classify them as members of the vegetables and fruit food group.
Prepare vegetable soup by following a set of directions. Sample vegetables cooked in a soup.

Materials: (For a class of sixteen children)

Copy of Stone Soup or flannel board story of Stone Soup posting of recipe and directions
16 plastic spoons
16 styrofoam cups
Paring knife
Vegetable peeler
Hot plate
Large pot with cover
(6 quart size)
Large spoon
Ladle
Cutting board
Measuring cups and spoons
Salt
Pepper
3 quarts water
8 beef bouillon cubes
1 package onion soup mix
1 quart canned tomatoes
Vegetables (1 per child)
(celery, green beans, peas, carrots, corn, potatoes, etc.)

How-To-Do-It:

1. Before class, preview a copy of Stone Soup or make a flannel board story out of it. Have each child bring in a vegetable from home to put in the soup. Place materials for cooking activity on table. Also, post the following recipe and directions for vegetable soup on poster paper or the chalkboard. (Picture clues can be added to the recipe and directions to facilitate understanding by children.)

   Vegetable Soup

   12 cups water
   8 beef bouillon cubes
   1 package onion soup mix
   1 quart canned tomatoes
   Vegetables (1 per child)
   Salt
   Pepper

Directions

1. Measure water into pot.
2. Add bouillon cubes.
3. Add onion soup mix.
4. Cover. Bring to a boil.
5. Wash vegetables.
6. Peel and cut up vegetables.
7. Add vegetables to water.
8. Add canned tomatoes.
9. Add salt and pepper to taste.
10. Cook on low heat for 2 hours.

Part I

2. Gather the children together in the story area. Tell or read Stone Soup.
   Questions to use with the story:
   How do you make stone soup?
   Name the things used to make stone soup. These things are called ingredients.
   What ingredient is unusual? Why was it put in the soup?
   What food groups do these ingredients belong to?
   Most of the ingredients belong to which food group?
   Without the unusual ingredient, this soup would probably be called _____. Why?

Part II

3. Move from the story area to the cooking area.
4. Observe and identify each vegetable. Classify vegetables by color, size, etc.
5. Discuss how to make soup. Review recipe and directions.
6 Follow directions for vegetable soup, allowing children to measure water, wash vegetables, add ingredients, etc., with adult supervision. Cutting should be done by an adult. Save a few pieces of each raw vegetable. Caution children about hot pot.
7. Taste soup when done. Remind children that soup is hot.
   Tasks to do with soup:
   Describe the flavor of the soup.
   Compare pieces of raw vegetables and cooked vegetables.
   How are they the same? Different?

Part III

8. Have children draw and color pictures of ingredients for vegetable soup and pictures that illustrate the steps of the directions.
9. Have the children classify pictures as ingredients and directions.
10. Arrange direction pictures in correct sequence.

Further Challenges:

1) Grow some vegetables.

2) Take a trip to the produce department of a local grocery store or vegetable garden.

3) Classify vegetables as parts of plants.

4) Make fresh fruit salad and identify and classify fruits.

References:

Barufaldi, J., et al. Heath Science-Level K. Lexington, MA: D.C. Heath and Co., 1985.

Carratello, P. Food and Nutrition. Sunset Beach, CA: Cracchiolo/Smith, 1980.

Paterson, D. Stone Soup. Mahwah, NJ: Troll Associates, 1981.

Rhodes, J.O. Nutrition Mission. Carthage, IL: Good Apple, Inc., 1982.

YELLOW FLOWERS

by John Butler

Focus: Children will learn about three adaptations that make the dandelion a successful plant.

Challenge: We can find plentiful dandelions in many places. What makes this yellow flower so successful?

Materials and Equipment:

Garden trowel
Hand lens
Dandelion picture (if possible)
Container to hold dandelion

How-To-Do-It: Plants and animals try to stay alive and expand the places where they live. They have needs that must be met, like getting water and food and reproducing. The ways they meet these needs determine if they will thrive.

"Tell me what you know about dandelions. (Show picture of dandelion or actual specimen.) How do they stay alive? How do they get water? How do they make and send out seeds?"

Today, we will take a walk to learn about dandelions. We will find some, look at them, dig some out of the ground, and look at the roots." Take the children on a walk and have them observe the above items. If the dandelion seeds are ready for disbursement, they will see the parachute apparatus which allows widespread seeding. Let the students blow a head of seeds away. Let them try to pull a dandelion out of the ground. They will come up with stem and head; the root will stay in the ground. If they dig out a dandelion, they can inspect the thick tap root which is responsible for water and mineral intake and for firm anchorage. Discuss with the children their findings.

Further Challenges: Dandelions are perennials. A new plant will grow from the root each year. The children may want to bring in a stemless root, transplant it, and let it grow.

They could plant dandelion seeds or sprout them on a piece of moist paper towel. (See Bagararium Activity in this Sourcebook.)

References:

Blough, Glenn. Discovering Plants. New York: McGraw-Hill, 1966.

Link, Michael. Nature's Classroom. New York: National Audubon Society 1978.

Russell, Helen. Ten Minute Field Trips. Chicago: J. Ferguson Publishing Company, 1973.

ANIMAL HABITATS

by Ellen Snoeyenbos and Willard J. Jacobson

Focus: To discover and determine what different environments and habitats a variety of animals live in.

Challenge: Where do animals live? What features do they come equipped with that make one environment better suited for them than another? Can they live in more than one environment?

Materials and Equipment:

Large manila cards with colorful photos of animals on them.

Three category cards to be placed out on a mat to designate rows of different categories.

Categories: Set 1 Land/Water/Air
Set 2 Desert/Jungle/Plains
Set 3 Hot Climate/Temperate Climate/Cold Climate

How-To-Do-It:

1. Show children the three category cards in Set 1 and talk about the differences between them. Try to get them to reason what an animal might need in order to live in one of these environments. Use Land/Water/Air classification first.

2. Start with one picture and ask a child to place it on the mat under the appropriate category. Ask why they chose a particular category. Encourage logical deductive thinking and verbalizing their reasons for their choices.

3. Only after the children find Set 1 easy should you go to Set 2 or Set 3. Repeat Step 2.

Further Challenges:

1) What would people need to live in these environments?

2) Children love to cut and paste. Encourage them to make murals or scrapbooks with different headings for the different categories.

3) A wide variety of animals from widely differing climates and habitats live in zoos. What do the zoo keepers do to make life pleasant for the various kinds of animals?

4) Take a trip to a zoo or game park to see these animals in the flesh.

KEEPING UP WITH SNAILS

by David R. Stronck

Focus: Children can observe the behavior and preferences of common garden snails.

Challenge: Discover where snails like to live and how they move to their preferred homes.

Materials and Equipment:

Helix, a common land snail found in many gardens and some woods. You may be able to collect these snails locally on warm nights by using a flashlight near the edge of bushes or shrubs. (Keep the snails in a cool, moist terrarium with occasional feeding of lettuce. The terrarium may be a large jar with air holes in the lid.)

Containers, e.g., small plastic or cardboard cartons
(If the activity is done indoors) old newspapers, moist soil with some small green plants
(For Further Challenge) glass or clear plastic jars

How-To-Do-It: Explain that we humans like to sleep where it is dry and warm. Ask where snails like to sleep. We can discover by observation what snails prefer. We can test our guesses by making good observations.

If the activity is done outdoors, select a site where the land snails are normally found. Ideally, the children will find the snails; e.g., hiding under leaves on the protected, dark side of a bush. Clearly define the area for such a search, e.g., only along the north side of the school building. Explain to the children how the snail may be gently lifted by its shell and placed in a container.

The children should work in pairs or in groups of three. After they find snails, they should place them at a point between a dark, wet area and a bright, relatively dry area. You may define such a point as anywhere along a line near the front margin of a hedge of bushes. Allow the children to watch their snail(s) and to share their observations with other groups.

If the activity is done indoors, the snails may be placed on a sheet of old newspaper, at a point between some moist soil (preferably with small green plants) and a dry, well-lighted area. There should be one or more snails for each group of two or three students. Again the children can observe the preferred direction of travel.

The children are expected to observe a preference for cool, wet areas. The activity should end with a discussion of who guessed correctly the places preferred by snails and how snails differ from humans.

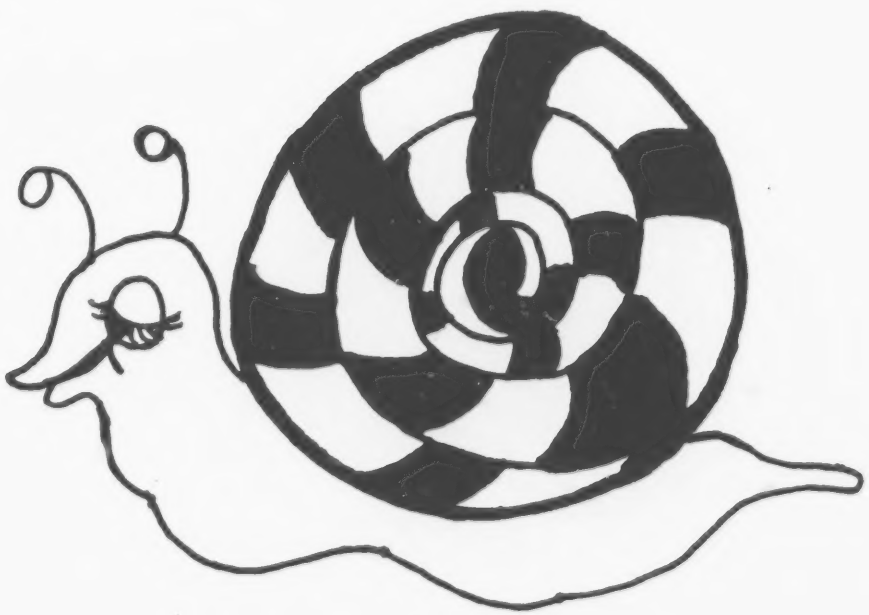
Further Challenges:

1) Keep some snails in a terrarium in the classroom. The terrarium may be a simple glass jar with holes for air in the lid. Put some moist soil in the bottom of this terrarium. Invite the children to predict what foods the snails will eat. Be sure that lettuce is included as one of the foods. Observe which foods are gone after they are placed for a day in the terrarium. Discuss how snails won't eat junk food; e.g., candy bars, etc.

2) The snails can be placed in glass or clear plastic jars. The children can then observe the movement of the snail over the glass surface by looking through the glass at the underside of the moving snail. The snail moves rhythmically by peristalsis, i.e., a contractile and expulsive muscular movement of a hollow organ in the body. The muscle on the foot of the snail glides over a mucus film laid down by glands of the snail. The children may also be able to observe the eating of some lettuce by a snail.

Reference:

Morholt, Evelyn, Paul F. Benjamin, and Alexander Joseph. A Sourcebook for the Biological Sciences. New York: Harcourt, Brace and World, 1966.



MAKING "YUKS" "AHAS" ... AN INQUIRY STUDY OF SPIDERS

by Bonnie Barr

Focus: The ability to ask good questions is a prime trait of a scientist. The question asking skill can be nurtured at a very young age. This skill can best be developed by providing children with open-ended experiences which stimulate questions. In this activity, children will practice the question asking skill while they explore the world of spiders. Children may have had "yuk" exposures to spiders in the past. "Yuk" encounters can put roadblocks in the path of learners which may hinder them for a lifetime. A positive and productive exposure to a "Yuk" encounter can help change it into an "Aha" experience.

Challenge: How is a spider like a fly? Different? Where does the spider's web come from? How does the spider use its web? How often does a spider make a new web? How are insects trapped in the web? What does a spider eat? How much does a spider eat each day? Can a spider hear? See? Does a spider take certain paths when it crosses its web?

Materials and Equipment:

A fiction book on spiders
Picture books on spiders
An orb-weaving spider
Spider cage (instructions follow this activity)

How-To-Do-It: An appropriate way to start a spider study with young children is to read them Eric Carle's book, The Very Busy Spider. The children can feel the web grow from page to page. As you read ask children questions such as: From what part of the spider's body does the web come? How many spiders work on a web? Did the spider make the straight or circular strands first? To what did the spider fasten its web? Why did the spider make its web?

Tell the children that they are going to watch in their classroom a real spider at work. Show the children the garden spider in the cage. Allow some time for visual exploration of the spider. Probe their observations with questions such as: How is the real spider like the one pictured in the book? Different? How is the web like that pictured in the book? Different? When the spider is standing in one place, does any part of it move? With how many legs does the spider hold onto the web?

Tell the children that they will feed the spiders with flies. Show them how the flies will be put into the cage through the hole in the top panel of the frame. (You will want to organize fly, beetle, or moth catching squads.) Garden spiders will also eat mealworms. Stopper the hole with a moist piece of cotton. This prevents escape of the spider and supplies it with the water it needs.

Model respect for living things. Make sure the spider is well fed and watered. When the study is complete, release the spider.

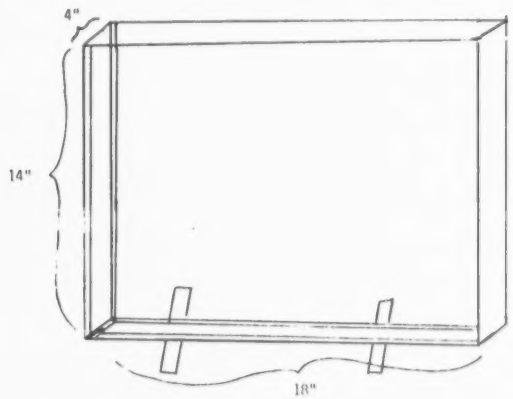
Further Challenges:

1) Webs can be preserved and saved for study. To do so, gently remove the Plexiglas panels from the cage. Place the spider in a jar. Gently place a piece of black construction paper flat against the web. Spray the exposed side of the web with hair spray. The spray will cause the web to stick to the paper. Blow against the web to assure contact of the web with the paper. Cut the threads which attach the web to the frame and remove the mounted web. For protection, place the mounted web into an acetate cover (i.e., page cover for photo album).

2) On pegboards or branched twigs, have children weave "spider webs" from yarn.

3) Track a spider. Place a jar lid on a large sheet of white paper. Fill the bottom of the lid with India Ink. Gently pour a spider, which has been trapped in a jar, onto the ink. the spider will leave tracks as it runs from the ink across the paper. How many tracks does the spider make? Which foot made which track?

4) Sing spider songs, such as "Incy, bincy spider," improvise movement activities based on the spider's movement.



Grooves ½" from both sides on sides and bottom of frame. Screw bottom to sides.

Top panel of frame cut 2-3/4" x 18". Drill ½" hole in center of top panel. Attach top panel to sides with screw eyes. Slide Plexiglas panels (16½ x 16) into grooves on both sides of frame.

References:

Carle, Eric. The Very Busy Spider. New York: Philomel Books, 1983.

Darby, Gene. Jerry Finds Spiders. Austin, Texas: Steck-Vaugh Co., 1969.

Perry, Phyllis Jean. Spiders. Minneapolis: T.S. Denison and Co., Inc., 1964.

Rockcastle, Verne N. Spiders. Cornell Science Leaflet, Vol. 60, 1966.

Shuttlesworth, Dorothy. The Story of Spiders. Garden City Books, 1959.

FEEL THE FEATHERS

by John Butler

Focus: Children will develop the skill of observation by using the senses of touch and sight.

Challenge: "Let's see what we can learn about feathers by touching and looking at them."

Materials and Equipment:

Feathers
Hand lens or large magnifier

How-To-Do-It: Say, "Today I have brought in some feathers. What do you know about feathers? What kind of animals produce them? What do feathers feel like?" Hold up a feather. Show the children some ways to look at and touch the feather. Use magnifiers if you have them and if the children are able to use them successfully. Have the children move the feather against and back along the grain as they touch it with their fingers and face. As the children work with their feathers, they will develop observations; discuss these with them. Some will notice the lightness of the feathers, some will notice the structure including the parts: shaft, vein, and barb.

Further Challenges: Feathers are waterproof but become clogged when too much oil is added. Seabirds suffer a price when caught in oil spills. Let the children add drops of water to a feather with a dropper. The water beads up and can run off. Let them add drops of cooking oil in a similar manner. The oil soaks in and the feather becomes sticky and heavy.

References:

Ardley, Neil. Guide to Birds. London, England: Piper Books, 1979.

Defendorf, Jean. Birds. Anchorage, Alaska, Anchorage School District, 1985.

ALL ABOUT ME

by Mildred Moseman

Focus: As children begin to be conscious of the world about them, they begin to be aware of their own bodies. Parents, too, must realize the important role they play in their children's early development as they are the children's first teachers.

Challenge: These activities will help children to better understand themselves, who they are, and the parts of their body.

PART A - THAT'S I

Materials and Equipment:

Paper - cut the child's size

How-To-Do-It: Have each child lie down flat on top of the paper. Draw around them with a black crayon. The child then colors in his shoes, socks, hair, and clothing as well as facial features. Yarn can be used for hair and scraps of material can be used for clothing. Have children name the parts of their body.

PART B - BODY RHYTHMS

Materials and Equipment:

Rhythm instruments

How-To-Do-It: The poem below, about the functions of different body parts, has two distinctive rhythms. Clapping only on the verbs in each line, the children hear these rhythms. Have them point to the body parts mentioned as they say each line.

I use my brain to think, think, think,

I use my nose to smell.

I use my eyes to blink, blink, blink,

I use my throat to yell.

I use my mouth to giggle, giggle, giggle,

I use my hips to bump.

I use my toes to wiggle, wiggle, wiggle,

I use my legs to jump.

Vary the exercise by not saying the body part when pointing to it. Use rhythm instruments when singing familiar songs. For example, on the song "Farmer in the Dell," have the farmer clap his hands, shake his tambourine, touch his toes, etc., instead of taking a wife, etc.

Further Challenges: Have children make a booklet about themselves including such things as: height, weight, a self-portrait, likes and dislikes, artwork, outline of their hands and feet, picture of their home, drawing of family and pets, a page showing skills they have, etc.

HOLD A BELL AND WALK A SPELL

by Susan A. Wittek

Focus: It is important for children to become aware of themselves as growing, changing beings. Movement, as creative expression, plays an important role in their life-building image, awareness, and direction of self. In this activity, children become aware of their bodies and what they can do. They develop coordination, large and small muscle skills, concentration, and independence. They control their movements as they walk around a circle holding a small bell without ringing it.

Challenge: Children are not to be pushed to participate. A lot can be learned just by observing. Children will eventually participate when they feel they are ready. It is important to keep the class free, comfortable, and individualized. Comment positively on their movements and use of muscles or whatever they seem to be doing well. As the term progresses, use this opportunity to challenge them individually. "Can you turn as you walk like that? ... Can you walk on tiptoe? ... Can you walk sideways? ... Backwards? ... Place the object in relation to the body, behind your back, over your head, etc.

Materials and Equipment:

Small bell, as shown in illustration
Large taped circle or any other shape

How-To-Do-It: Make a circle or other shape out of masking tape. Have the children come to the circle and sit; say: "Check to see that you are sitting on the circle, that your legs are crossed, feet are under you, and your hands are in your lap. Check to see that there is space between you and the next person." Allow time for the children to adjust themselves. Show the children the bell. Hold it between the thumb, index finger, and middle finger. Ring the bell. Ask the children if it made a loud sound or a soft sound. Tell the children to close their eyes and listen to the bell again. Again, ask them if it was a loud or soft sound. Vary the procedure to fit the needs of your children. For example, have them raise their hands when the sound stops. Next, say: "Now we are going to walk around the circle with the bell, but this time we are going to try to not let the bell ring." Demonstrate for the children using very slow and quiet movements. From a sitting position, stand and walk around slowly and place the bell in front of a child. To get the action started, you may need to whisper to the child, "Would you like to take this bell and place it in front of someone?" The child repeats this action until everyone has had a turn. Ask the last child to bring the bell to you.
Comments: The first time you try this, children will, at times, place the bell in front of the person next to them. Don't be discouraged. As they do the activity again and again, movement does increase.

It is important that children control their body on command. When this occurs, an inner discipline develops and assists in cognitive learning. Emotionally, confidence of coordination becomes a conditioned element in a child's maturation. Thus, their physical behavior and mobility will become a secure force for the rest of their lives.

Further Challenges: Have the children move as before, but this time have them carry two bells or a tray with something on it. After reading a story or poem, ask the children . . . Can you move like that? What kind of body shape would a certain character have?

References:

Cherry, Clare. Creative Movement for the Developing Child. Belmont, California: Fearon Pitman Publishing Co., 1971.

Harlan, Jean D. Science Experiences for the Early Childhood Years. Columbus, Ohio: Charles E. Merrill Publishing Co., 1976.

Joyce, Mary. First Steps in Teaching Creative Dance. California: National Press Books, 1973.

CHAPTER IV

PHYSICAL SCIENCE ACTIVITIES

SIFTING SAND AND OTHER PARTICLES

by Gerald Wm. Foster

Focus: Children will be able to compare sizes of particles by mixing and sifting. They can also compare size of particles to size of openings in a sifter.

Challenge: The children should be able to put sifters in the proper order so that the particles will be sorted by size.

Materials and Equipment:

Colored sand of different sizes
Set of sifters with screens of different sizes
Large tablecloth
Containers for sand

How-To-Do-It: Have a child sit in the middle of a spread out tablecloth. Have small containers of different sizes and colored sand in a tray with different sized sifters. Ask the child what they can find out about the sand by mixing the sand and using the sifters. Make sure the sand is kept on the tablecloth for easy clean up. Children should be able to put the sifters in the proper order according to size of particles.

Further Challenges: Have the children make sand paintings. Give children such items as salt, baking soda, baking powder, sugar, etc. to be rubbed by colored chalk. When rubbed by the chalk on a metal tray, the material becomes that color. They can be sifted or layered in jars to make patterns.

Reference:

Phillips, Darrel G. Sciencing: Towards Logical Thinking. Science Education Center, University of Iowa, Iowa City, Iowa 52242, 1981.

WONDROUS WAYS OF WATER

by Robert W. Johnson

Focus: Water goes down, up, over, into, and out of things.

Challenge: How many different ways can you make water go somewhere?

Materials and Equipment:

Medicine cups
Eye droppers
6" x 1/2" desk blotter strips
Paper towels
Waxed paper
Porous/non-porous fabrics
Sand
Clay

How-To-Do-It: To start the activity, give each child one medicine cup half full of water. Ask them to observe and describe the material in the cup. What does it look like, feel like, smell like, sound like? No tasting for safety reasons.

1. Pass out one eye dropper to each child. Direct them to fill dropper from the water cup. Hold dropper at eye level over work space and gently squeeze water from dropper. Ask them to note the direction "water goes." Record observation on chalkboard: "Water goes down."

Repeat essentially the same observing and recording procedures for the following activities:

2. Place blotter strips in water cup. Note: "Water goes up."

3. Pass out another medicine cup filled with water. Pour this sample into first cup. Note: "Water goes over."

4. With a paper towel, direct children to slide towel slowly towards overflowed water pile until they first touch. Note: "Water goes into."

5. Place damp paper towel somewhere in room so that it can be observed next day. Note: "Water goes out of."

Summarize the two-day activity by noting on chalkboard:

We found out that: Water goes _____."

_____.

_____.

_____.

_____.

Further Challenges: Encourage children to experiment with materials at hand to find new ways of making water go down, up, into, etc.

How could we change ice into water? What happens when you mix water with (1) corn oil or (2) glycerine?

Reference:

Elementary Science Study. Drops, Streams, and Containers. St. Louis, MO: McGraw-Hill Publishing Co., 1975.

WATER, WATER, EVERYWHERE

by Phyllis Katz

Focus: An introduction to the water cycle through poem, rhythm, and song.

Challenges: Through the use of poetry (and/or music), the children will become more conscious of where water comes from, that it flows, evaporates and continuously recycles.

Materials and Equipment: A teacher copy of the words, a tape and tape recorder with singing prerecorded, if desired, or piano, if teacher plays.

How-To-Do-It: Motivation: Where have you seen water today? Encourage children to name and talk about all the places in which they are aware there is water, from a backyard stream to a leaky faucet. They will begin to realize for themselves that water is EVERYWHERE. We can sing a song (or recite a poem, if the teacher isn't musical) that reminds us all about where water is and where it comes from and goes to:

Have children stand up, clear of any tables and desks. Have them move their arms in large circles. Water goes around in circles too. Say the words to the poem, two lines at a time. Have the children repeat with the motions shown below.

Depending on the group and teacher, the poem can now be repeated in its entirety and set to music as given below.

Water in circles
Around and around
It's up in the air
Then it's down on the ground.

It flows down in rivers
It runs in the sink
All things that live here
Must take a good drink.

We use water to clean
We use water to cook
Water is everywhere
Let's take a look.

The clouds in the sky
Are just water in puffs
When they get dark and heavy
Then down comes their "stuff."

Down comes the water
To fill up the streams
And the soft pitter patter
Can fill up our dreams.

(copyright P.K. 1981)

This can be a "theme song" for a series of lessons on water or a good directed activity that lets the children move about while reinforcing concepts.

Further Challenges: As a general introduction to a broad concept, this can be followed by many activities. Some suggestions: Have children look through magazines and locate items that have a water content. (They may not have thought of juices, people, pets, flowers and so on, yet.) Water as a liquid: Have children compare the difference between "pouring" crayons and pouring water into various sized containers. If the group is small enough and/or well-coordinated, they could walk through the school or playground area and the teacher could list "wet" and "dry" items and see if the children can form categories.

MIXING IT UP

by Leon Ukens

Focus: This activity will allow children to observe the properties of common materials when these are mixed with water. The actual results are less important than having the children utilize their powers of observation and communication.

Challenge: What happens when various solids are mixed with water? What happens when various liquids are mixed with H_2O?

Materials and Equipment:

Clear plastic cups — for each child
Plastic spoons
Various solids and liquids, such as salt, sugar, mustard, ketchup, Jell-O, Kool-Aid, constarch, sand, grapes, food coloring, etc.

How-To-Do-It: Give each child a plastic cup and spoon. Have them mix, one at a time, the various materials you have provided them with some water. Observe what happens and discuss their observations with them. Pour out the mixture and repeat with another substance. Continue as long as interest remains. The substance when mixed with water may stay the same, disappear (dissolve), clump, float, sink, become suspended, etc.

Further Challenges: Try mixing other substances with water. Have the children predict first what they think will happen when mixed. Mix vinegar and baking soda for a different type result.

MIXING COLORS

by Janie Knight and Phyllis Huff

Focus: There are two types of colors: primary and secondary. The secondary colors are made when two or more of the primary colors are mixed together. Color also affects our feelings.

Background: This lesson should follow or be a part of a study on color/tints/shades and how they make us feel. The children should have some awareness of the importance of color in their world: in clothing, in foods, in decorations. The children should know the primary colors by name.

Challenge(s): What happens when different colors are mixed together? How does the result affect us? Can the results be predicted in any way?

Materials and Equipment:

Overhead projector and screen
Clear 9" x 9" pyrex container
Water to partially fill the container
Food coloring
Record/tape player with soothing (classical) music

How-To-Do-It: Begin by seating the children where they have a good view of the screen and are comfortable. Start the music and place the pan with water on the overhead. Ask the children what they see. Let them describe it. Place a drop of red food coloring in one corner of the pan. Ask the children what they now see. What is different? What is the color? How does it make you feel? Is it more exciting than before when there was no color? Next to red, put a drop of yellow and watch the colors mix. What new color do you see? How did that happen? What color have you used to make the new color? How does this color make you feel? Continue by adding blue next to the red; by adding blue next to the yellow. Allow questions after each addition. After using most of the space and creating as many colors as desired, mix all the colors together. Ask the children what happened? How does the new color make them feel? Why do you suppose the new color is not like the other colors?

Further Challenge: Since interest in this activity is usually very high, the children could continue to explore in small groups using either food coloring or tempera paints.

ICEBERGS HAVE CALVES

by Lynne Kepler

Focus: Children will be using colored ice cubes to simulate iceberg calves and to investigate the melting process.

Challenge: Children are first asked to predict what will happen when the iceberg calf (ice cube) is placed in water. During the investigation, they are given the opportunity to discuss what they see happening to the "calf" and to suggest conditions in which the "calf" will last the longest.

Materials and Equipment:

Colored ice cubes (coloring helps the children focus on the melting process)
Small aquarium filled with water

How-To-Do-It: Set the mood for this lesson by reading Icebergs by Roma Gans.

Next, introduce the iceberg calves (the name for pieces which have broken off of an iceberg) and ask the children what they think will happen when the iceberg calves are placed in water. As the children watch, encourage them to describe what they observe happening to the "calves."

After the calf has melted completely, ask the children how they might make the iceberg calves last longer--remember it will be in water. Suggestions might include putting the calves in colder water, putting the aquarium and iceberg calves outside if it is cold out of doors, larger "calves," etc. Try out some of their ideas as a class!

Further Challenges: Have the children place colored ice cubes, such as blue ones, in liquids, such as lemonade. Have them observe the color changes that take place.

References:

Gans, Roma. Icebergs. New York: Thomas Y. Crowell Co., 1964.

Teacher's Guide for Ice Cubes. St Louis: Webster Division, McGraw-Hill Book Co., 1969.

FROST WATCH

by John Butler

Focus: Children learn that frost causes important changes in the organic and inorganic parts of the environment. This is a seasonal activity.

Challenge: Frost occurs when water in the air or in the ground freezes to ice. What changes in plants and the soil do you think frost causes?

Materials and Equipment:

No materials will be necessary.

How-To-Do-It: Some morning when frost is evident, usually the first time provides motivation, say, "How many of you noticed the white covering on the grass and windows this morning? What is it? Where does it come from? What causes it?"

Frost is common in the spring and fall of the year. It causes some important changes in nature. It causes plants to wilt, and the cold temperatures which cause frost cause the ground to freeze, expand, push up rocks, and loosen soil. Take a walk to learn about frost and the work it does.

The children will discover wilted plants. Look especially for shriveled leaves and bent stems of non-woody plants. They will find rocks from pebble to cobble size that have been pushed to or near to the surface. The loosening of the soil around the rocks is a natural plowing in preparation for the natural planting of seeds which have just matured in late summer and fall.

Further Challenges: Expanding ice has tremendous force. Frost heaves cause breaks in roadways. The continual frost and thaw cycle is a major cause of weathering and erosion. The children can work with a model of this. Tell them to find a rock with some cracks. Spray the rock with water so that it runs into the cracks. Put the rock in a freezer. Thaw. Repeat this process. Observe the results.

The children may enjoy collecting their own frost. Let them set out a collector overnight. A piece of glass works well. In the morning, they can scrape off the frost and inspect it.

References:

Link, Michael. Nature's Classroom. New York: National Audubon Society, 1978.

Russell, Helen. Ten Minute Field Trips. Chicago: J. Perguson Publishing Company, 1973.

WHAT'S IN THE CONTAINER?

by Nasrine Abide

Focus: Experiencing the presence of air and understanding that it is located everywhere is a difficult concept for children to understand. In this activity, children will experience the presence of air after experiencing solids and liquids.

Challenge: What are the characteristics of a solid in a baggie? A liquid in a baggie? A gas in a baggie?

Materials and Equipment:

Plastic bags
Some solids like sand, sugar, salt, etc.

How-To-Do-It: Have the children play by pouring into a plastic bag some solids like sand. Tie closed. Have them observe the characteristics of the sand in the baggie. Discuss their observations with them. Do the same with water. They will probably need some assistance with this task. Again, have them make their observations of the plastic bag of water and discuss their observations with them. Repeat again with air. A swooping motion with the bag will trap some air in it. How were they different? How were they alike? Pour the contents of each bag out. Let the children feel the presence of the air as it is emptied. You can "poof" the air out, perhaps in the child's face.

Further Challenges: Have children look for the presence of air in various places. See if they can help you collect it.

MAGIC WIND

by Mary Rita Brady

Focus: Children will recognize that air can move objects. (Air is a very abstract concept for young children because they cannot explore it with their senses.) Children should have as many "hands-on" experiences with air as possible to develop this concept.

Challenge: Can you move something without touching it?

Materials and Equipment:

For each child:

1 straw
A collection of objects, including a tissue, a small ball, a small toy car, a leaf, a feather, etc.

How-To-Do-It: On a windy day, direct children to look outside. Are tree leaves moving? Are other plants moving? What is making these things move? (Accept wind or air.) Explain to children that air is all around us. We breathe air. We cannot see air, but we can watch it move things. Tell children that they will use air to move things.

Children should have their own straws. Instruct children not to use each other's straws. Groups of three or four children can share a tray of the other objects.

Children should be challenged to move each of the objects on the tray without touching them with another object. Children will discover that they can make the objects move by blowing air on them. Children will also discover (or should be led to discover) that blowing through the straw concentrates the stream of air and makes it easier to move the heavier objects.

Children will recognize that wind can move objects. Children will conclude that heavier objects are more difficult to move.

Have a summary discussion with children including:

Which objects were easy to move?
Which objects were difficult to move?
Which objects could not be moved?
What moved the objects? (air)

Further Challenges: Think of another way to make air move the objects that could not be moved by blowing through the straw.

Reference: Many excellent activities for exploring air can be found in:

Harlan, Jean. Science Experiences for the Early Childhood Years. Columbus, OH: Charles E. Merrill Publishing Co., 1984.

THE WEATHERWATCHERS

by Mary Ann Ellis

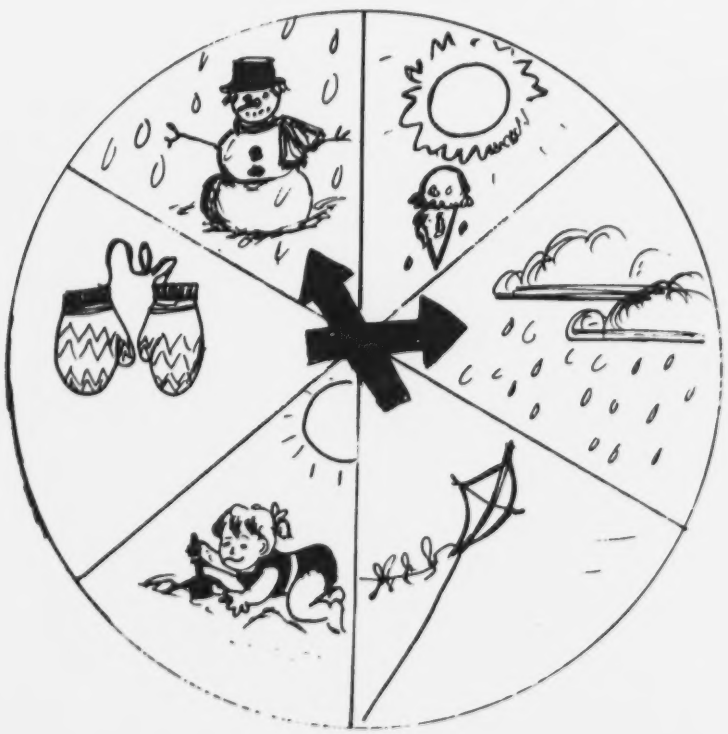
Focus: Weather affects each of us every day. Preschoolers can develop an awareness and appreciation of changes in weather and increase their vocabulary with some simple weather terminology.

Challenge: Observe weather everyday. Set simple "weather clocks" each morning and discuss observations. Make changes as needed during the day. Learn and use correct terminology describing weather.

Materials and Equipment:

Scraps of colored construction paper
Black construction paper
One metal brad for each child
Catalogue or magazine pictures

How-To-Do-It: Begin by discussing the weather and all the different types. Give each child a paper plate that has lines dividing it into six sections. Have students draw or paste pictures to symbolize different weather conditions such as: sunny, cold, snowy, warm, windy, rainy. Each morning when they arrive at school, discuss the weather and let each child set his/her weather clock. Make changes during day if they occur.



LIGHTS PLEASE

by John Butler

Focus: Children will learn that light moves from a source and that it can move through some things and not through others.

Challenge: What things can light travel through? What things can light not travel through?

Materials and Equipment:

Flashlights
Transparent objects
Opaque objects
Transluscent objects

How To-Do-It: Darken the room as much as possible. Shine a flashlight on the wall. Ask the children how the light got there. Hold a book in front of the flashlight and try again. Discuss the difference with them. After giving the children flashlights, instruct them to find things that light can travel through and things it cannot. Hold up the materials they tested and discuss their results.

Further Challenges: See if anybody can come up with a generalization about objects that light can pass through and objects it cannot. See if they can take a transparent object and make it an opaque one.

Reference:

Freeman, Ira M. Physics Made Simple. Garden City, NY: Doubleday and Company, 1965.

A FLASHLIGHT PARTY

by John Butler

Focus: Children will develop the skill of observation. Observation is an important skill. Professional scientists might observe the behavior of feeding whales or the effects of a black hole.

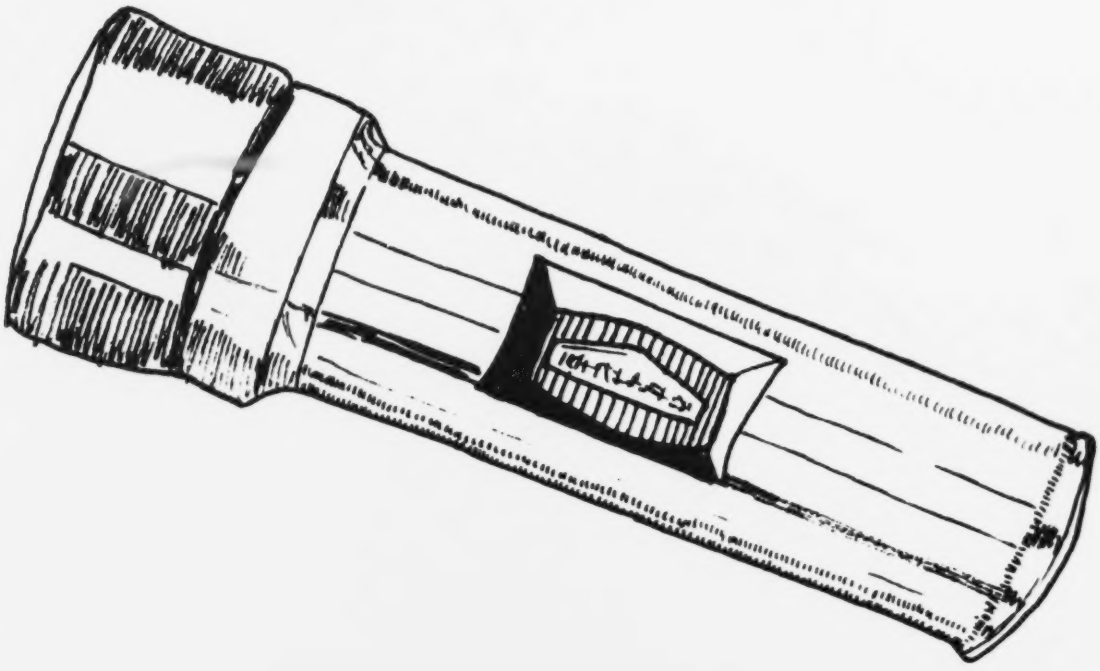
Challenge: The use of a flashlight motivates and enables the children to look more closely at things in the room. What new things can the children notice? What new view of old things can they notice?

Materials and Equipment:

Flashlights

How-To-Do-It: Darken the room as much as possible. Make sure each child has a flashlight. Instruct them to look around the room and to notice something they may never have noticed before. Warn them to be careful about running into each other or other items. The children will shine their lights on various things as they move around the room. One might focus on a square of tile or carpet, another at jackets in the closet, and another at some sticks in the science center. Discuss with them their findings. You may want to do this as they are discovering.

Further Challenges: Hide some item in the room. Describe it to the children. See if they can find it with their flashlights.



COLORED LIGHT

by Gerald Wm. Foster

Focus: Children will use colored cellophane to make different colors. They will also see that objects have different colors when looked at through the cellophane. This is the basis for camouflaging.

Challenge: What colors are produced when different colors of cellophane are placed over various objects? What colors will disappear when various colors of cellophane are held together?

Materials and Equipment:

Pieces of red, blue, yellow and green cellophane
Set of crayons or magic markers
Plain white paper
Set of colored pictures

How-To-Do-It: Ask the children to hold up cellophane to either a light coming from in the room or at a window. Tell them to hold different pieces of cellophane together and look through them to see if there are any differences in colors. Have the children make certain colors by combining certain colors of cellophane. Have them match crayon colors with colors produced by the cellophane. Ask them to look at objects through different colors of cellophane to see what happens. Have the children walk around with colored cellophane over their eyes. Have them discuss what happens.

Further Challenges: This could be followed up by giving the children small cups of colored water and eye droppers to make new colors. Note: Color mixing with light (cellophane) and with pigments (colored water) are not the same.

WHAT DO I LOOK LIKE?

by Stearns W. Rogers

Focus: This activity will deal with observations made by children as they look at their reflection in a flexible mirror.

Challenge: How does their image change as children change the shape of a flexible mirror? Can they make any predictions about their image?

Materials and Equipment:

Piece of clear flexible plastic (transparency or plastic report cover)
Piece of dark construction paper

How To-Do-It: Place the construction paper behind the clear plastic. It can be attached with tape. This is your mirror.

Bend the two sides of the mirror toward you. Look at yourself. Bend the two sides of the mirror away from you. Look at yourself. Bend the top and the bottom of the mirror away from you. Look at yourself. Bend the top and the bottom of the mirror toward you. Look at yourself. Bend the mirror in various other ways. Look at yourself.

Further Challenges: Make or visit a mirror funhouse. Try using construction paper of different colors.

SHADOW SUSPENSE

by Joan Tephly

Focus: Young children love shadow play. Shadows are like magic to them -- first they are there and then they are gone. Shadows can be used in many ways in the early childhood curriculum, providing children with many manipulative experiences.

Challenges: By exploring shadow forms, young children will discover that:

1. Shadows are formed by an object or objects coming between a light source and a surface;
2. Shadows can be manipulated and changed (sometimes a shadow will resemble the real object and sometimes it won't);
3. Sometimes there is no shadow.

Materials and Equipment:

Lamp or filmstrip/slide projector
White bedsheet or large white paper to use as a screen
8-10 familiar classroom objects

How-To-Do-It: Introduce shadows at a group time. Use a light source, familiar classroom objects, and a "screen" surface for projection. Position the "screen" in a manner so that the children will be on one side; and you, the light source, and the objects will be on the other. This is the same positioning as would be used for a shadow puppet show.

Create interest by beginning with a guessing game. Hold up a few of the classroom objects, one at a time, creating a shadow and ask the children to identify each. Children love to have some control so once the guessing pattern is established, allow individual children to take turns "being the teacher" and making the shadow with a mystery object.

After this introductory experience, allow the children one or two days time to manipulate and explore shadow-making with these objects and any others they choose. This can be done singly or with classmates during open-choice times in the daily schedule.

During such exploration, occasionally guide the children's exploration: What kinds of shadows can they make? Can they make shadows move and change? Can they make shadows which look like other objects? Can they make a shadow larger and smaller? What are ways to make a shadow go away? Your local libraries will probably have a book or two demonstrating hand shadows.

Once this interest in and fun with shadows is established, extension is possible with many other activities (see Further Challenges).

Further Challenges:

1) Catch shadow profiles (an adult usually needs to do the "catching" as preschoolers' hand control is not steady enough). Seat the child between a light source and a piece of black paper. Encourage the child to hold still. (I tell them to hold still while I count to 20.) Outline the head profile with a pencil or white crayon or chalk. The children enjoy guessing each other's silhouettes.

2) Prepare and present a shadow puppet show using a familiar story with few props, such as "The Billy Goats Gruff."

3) Play "Catch My Shadow" (best as an outdoor game). Children run across a sunny area with shaded "safe" zones at either end. "It" calls "Shadows, run!" "It" captures other children's shadows by jumping on them. Those children whose shadows are captured must join "It's" team. In games such as this, children must be taught to be careful of each other in the capturing act to avoid injuries.

4) If an overhead is available, children can make their own transparencies using shadows of their choice. Making a shadow of their name is always enjoyed. Turning the transparency around and over is valuable exploration.

5) An extension of two and three dimensional shapes and their shadows is valuable with the older or gifted preschool child. Two dimensional shapes can be explored using open wire geometric shapes (circle, triangle, etc.). Unit blocks can be used for three dimensional shape exploration.

6) Look for books both about light and shadows and with stories using shadows as illustrations. An excellent example of the latter is the book Mother, Mother, I Feel Sick! Call For The Doctor Quick, Quick, Quick! by Remy Charlip and is available through Scholastic Books.

GROWING SHADOWS

by David R. Stronck

Focus: The length of shadows change with the time of the day and the angle of the sun.

Challenge: Is my shadow taller or shorter than my body?

Materials and Equipment:

String
Marking pen
Chalk
(For Further Challenges) ruler, flashlight, sundial

How-To-Do-It: On a sunny day, plan to look at shadows at least twice, i.e., at two intervals separated by two or more hours. Each time, take the children to the same place outdoors. Have them mark their spot for standing. On a lawn, the place can be marked by a small garden stake. On asphalt pavement, chalk can mark the spot. In a rocky field, a small pile of rocks may be used.

The children should work in groups of three. The first child stands at a selected spot and observes their shadow. The length of the shadow is measured by using a long string. A second child holds one end of the string to the tip of the standing child's shoe. The third member of the team stretches the string to the end of the shadow and marks the string with the marking pen. Masking tape on the string is another way to mark the length of the shadow.

Have all the children compare the lengths of their strings. Taller children will have longer strings. Save these strings for comparisons. If the first observation is done at 9 a.m., a second observation could be done at noon. The noon shadows will be much reduced in length, in comparison with the morning (or afternoon) shadows. Have the children compare the length of their strings at the two different times of the day. Invite them to explain why the lengths changed.

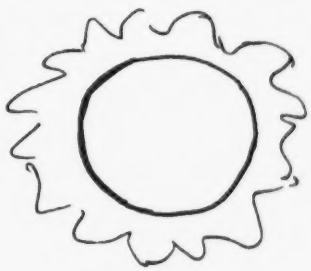
Further Challenges:

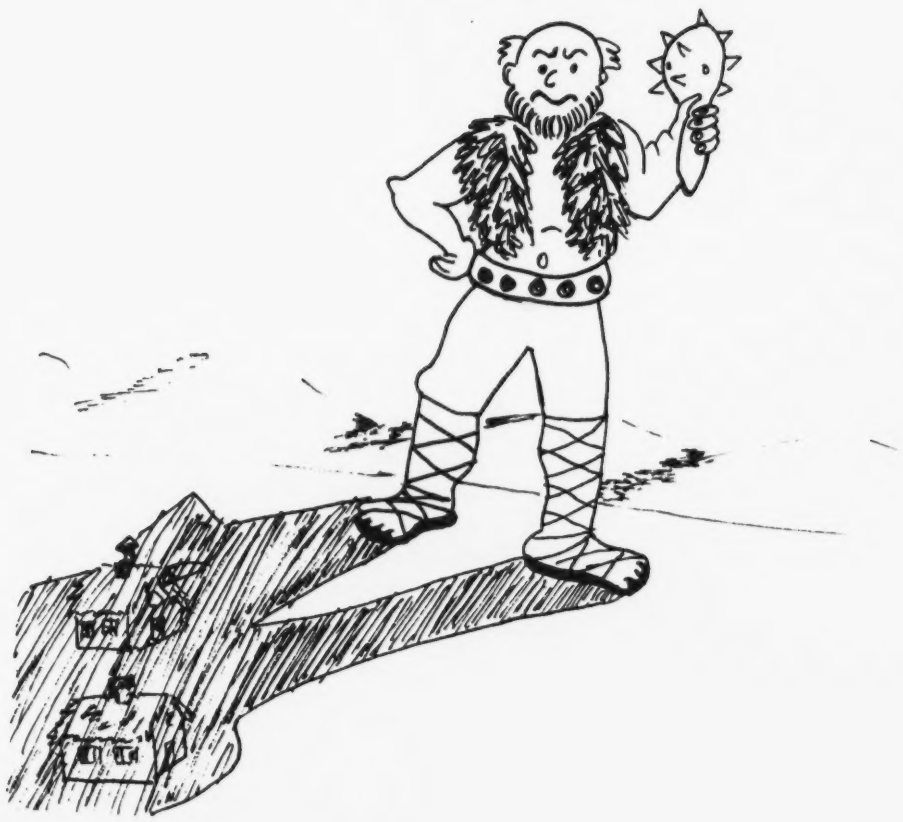
1) Use rulers to measure differences in the length of the strings. Record these measurements. Compare the measurements at the same times of the day with different dates in the year. Note the seasonal changes of the sun's angle.

2) In a darkened classroom, use a flashlight to compare the length of shadows from a small object, e.g., a pencil. If the flashlight is held almost above the pencil, there will be a very short shadow. If the flashlight is held near the table top where the pencil is held, the shadow

may be rather long. This demonstration shows how the angle of the sun's rays changes the length of shadows.

3) Use a sundial to show the changing position of the sun. A simple sundial can be constructed by using any stick or pointer standing upright on a flat plane. On the plane, a piece of wood or cardboard can be used to mark the line of the shadow at different hours of the day. The pointer will be south of the plane. At noon, the shadow should be directed along the farthest side of the plane (from south to north). The children can mark the lines along the shadows. They can return each day to note that the sundial is keeping correct time according to clocks.





WHAT'S THE ATTRACTION?

by Rowlee Miller

Focus: Children are encouraged to make observations and to communicate.

Challenge: The children will become familiar with magnets and some of their uses.

Materials and Equipment:

Iron filings, round "doughnut" magnets (available at electronic stores, such as Radio Shack), acetate sheets, white cardboard, tape, shells, rocks, or walnut shells.

How-To-Do-It: Make cardboard faces for the children. On an 8 1/2 x 11 inch piece of stiff, white cardboard, draw a face. Do not draw any hair, eyebrows, beards, etc. Sprinkle a liberal amount of iron filings on the cardboard. Cover with the clear acetate film. Tape all edges securely.

The Iron filings can be moved by a magnet to create the hair, eyebrows, mustache, or beard.

Blank "creative" boards can also be prepared so that children can draw their own designs with the iron filings.

Any magnet can be used to move the filings. However, the round, ceramic, "doughnut" magnets are inexpensive (20¢) and fun for the children.

Show the children how the magnets will attract each other - form a stack and repel each other by "floating" them on a pencil (reverse every other one).

Unlike a bar magnet which has the poles on the ends, the round magnets have them on the sides.

Allow the children to make a refrigerator magnet to take home. Glue a seashell, a small rock, walnut shell, or other object to the doughnut magnet.

Futher Challenges: Have children sort things that a magnet will pick up from things that it will not.

MAGNET MYSTERIES

by W. R. Zeitler

Focus: This activity is designed to be an introduction to the study of magnets and magnetism. Much of what is discovered will be left up to the individual child.

Challenge: How do magnets behave? What materials are attracted to a magnet? What materials are not attracted to a magnet?

Materials and Equipment:

Magnets - bar or otherwise

How-To-Do-It: Tell the children that you are going to give them an object. They are to find out as much about the object as they can. (Give each a magnet.) They may use the object in the classroom or out. Permit the children to investigate with the magnet as they wish. DO NOT tell them that the object is a magnet. Near the end of the day, assemble the children into one group. Ask them to tell about the observations they made with the object. If this is not feasible, discuss it with them individually. Ask them if anyone knows what the object is. If not, tell them it is a magnet.

Further Challenges: Investigate any question that arises in the above discussion. It might deal with the magnet, the materials attracted and not attracted, or magnetism passing through various materials.

SHOCKING! STATIC ELECTRICITY EXPERIMENTS

by Rowlee Miller

Focus: Observation is the main skill that is emphasized in these activities. Encourage the children to describe in detail what is happening, so that communication skills are also developed.

Challenge: The children should learn some of the ways of giving common objects an electrical charge.

Materials and Equipment:

Balloons
Plastic combs
Puffed rice

How-To-Do-It: Activities involving static electricity should only be attempted during winter months when the rooms are heated. These conditions will generally result in dry air which is necessary for success.

Help children to blow up and tie balloons. Have the children rub them vigorously on their hair or woolen clothing. Let the children "stick" them on the wall. See whose balloon stays up the longest.

Tie some thin thread to individual pieces of puffed rice or wheat. Hang them from the ceiling. Have the children comb their hair vigorously or rub the comb between a piece of Saran Wrap. Hold the comb near a piece of puffed rice. See what happens. The rice will move to the comb.

Run a stream of water in the sink. Hold a "charged" comb near the stream. See what happens. The stream of water will move towards the comb.

If the room has carpeting, the children may "charge" themselves simply by walking on it!!

Further Challenges: See if other materials will take a charge. Try a metal comb instead of a plastic one. Try rubbing a pencil with Saran Wrap instead of the comb. Are the results the same?